Installation Guide

HP bh5700 ATCA 14-Slot Blade Server

First Edition

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1 Introduction

Introduction

NOTE There are some current issues with the HP bh5700 ATCA 14-Slot Blade Server. The issues are in the process of being solved. Please refer to www.docs.hp.com (customer-viewable) to see the latest list of issues and ways to work through them. The list of issues will be updated frequently.

This document provides the following information for the Advanced Telecommunications Computer Architecture (AdvancedTCA or ATCA) Standard, HP bh5700 ATCA 14-Slot Blade Server:

- An overview of the HP bh5700 ATCA 14-Slot Blade Server.
- An installation checklist.
- Safety, communications interference, and electronic discharge considerations.
- Unpacking the 14-Slot Shelf.
- Rack mounting the 14-Slot Shelf.
- Connecting external power to the 14-Slot Shelf.
- Factory default operating topology.
- Example VLAN topology configuration.

NOTE An Installation Checklist is provided in Table 1-1 on page 14. Use this checklist to help ensure that you follow the proper sequence. Observe all safety procedures while preparing your site for installation, unpacking, and installing the 14-Slot Shelf.

Overview

The HP bh5700 ATCA 14-Slot Blade Server can be configured with up to fourteen individual blades installed into the shelf blade cage. For high reliability telecommunications operation, each 14-Slot Shelf must have a minimum of two matching Ethernet switch blades installed in the blade cage hub slots (physical Slots 6 and 7). Additional blades (processor blades, advanced mezzanine card [AMC] blades, and others) can be installed in the 14-Slot Shelf as required.

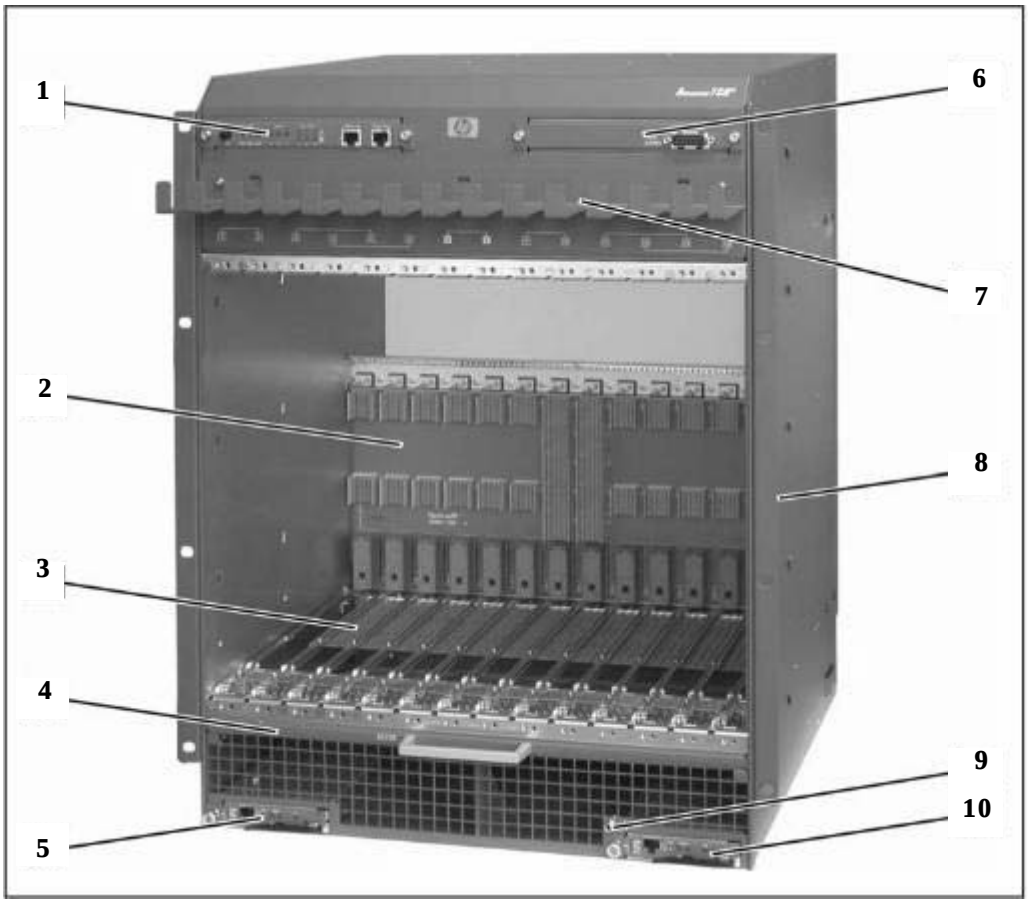
See Figure 1-1 on page 11 for the typical HP bh5700 ATCA 14-Slot Blade Server configuration:

- One 14-Slot Shelf (blade cage chassis and components)
- Two Ethernet switch blades
- Two Intel® Xeon dual processor blades.

The 14-Slot Shelf blade cage chassis and components are defined in Figure 1-2 on page 12 and Figure 1-3 on page 13.

Figure 1-1 HP bh5700 ATCA 14-Slot Blade Server, Basic Configuration

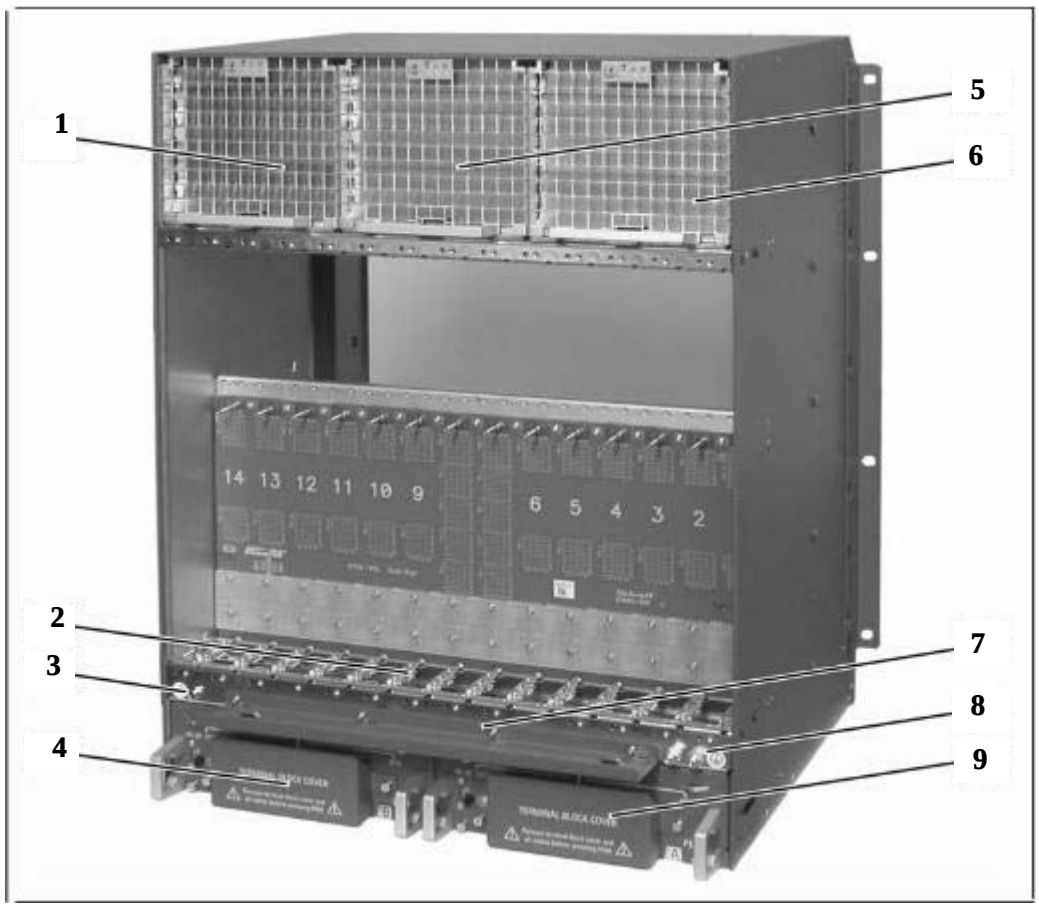
Figure 1-2 HP bh5700 ATCA 14-Slot Blade Server (Front View)



Use the following list to identify the callouts from Figure 1-2:

1. Alarm display panel
2. ATCA 14-Slot backplane
3. Front card cage
4. Air filter
5. Primary Shelf Manager (left)
6. Alarm connector panel
7. Front cable tray
8. Rack mounting flange
9. ESD wrist strap terminal
10. Secondary Shelf Manager (right)

Figure 1-3 HP bh5700 ATCA 14-Slot Blade Server (Rear View)



Use the following list to identify the callouts from Figure 1-3:

1. Fan tray #2
2. Rear card cage
3. ESD wrist strap terminal
4. Power entry module (PEM B)
5. Fan tray #1
6. Fan tray #0
7. Rear cable tray
8. Shelf ground terminal (M6 studs)
9. Power entry module (PEM A)

Installation Checklist

This section provides an installation checklist to assist you with preparing the installation site and installing the 14-Slot Shelf.

Table 1-1 Installation Checklist

Installation Procedure (See chapters 1 through 5)	**In-process**	**Completed**
SITE PREPARATION VERIFIED		
WARNING: Observe all electrical safety precautions when configuring the external power supplies. This is a high voltage hazard. External power supplies configuration verified		
Site environmental requirements verified		
Protective earth ground verified		
UNPACKING THE SHELF		
Shipping container inspected for damage		
All packing material removed from Shelf		
Shipping inventory completed		
Front and rear cable trays attached to Shelf		
RACK MOUNTING THE SHELF		
Rack mounting flange configured		
Seismic rack mounting procedures completed		
POWER CONNECTION		
WARNING: Ensure that all power domain circuit breakers are switched *OFF* before connecting power and return cables to the Shelf. This is a high voltage hazard. Power and return leads connected to PEMs		
External power supply voltages verified		
Protective earth ground connected to Shelf		

Safety Considerations

All site preparation, installation, and service work on the 14-Slot Shelf must be performed by qualified personnel.

WARNING **Failure to follow all electrical and mechanical safety precautions in this document could result in serious personal injury.**

Communications Interference

HP system compliance tests are conducted with HP supported peripheral devices and shielded cables, such as those received with the system. The system meets interference requirements of all countries in which it is sold. These requirements provide reasonable protection against interference with radio and television communications.

Installing and using the system in strict accordance with HP instructions minimizes the chances that the system will cause radio or television interference. However, HP does not guarantee that the system will not interfere with radio and television reception.

Follow these precautions:

- Use only shielded cables.
- Ensure that all cable connector screws are firmly secured.
- Use only HP supported peripheral devices.

Ensure that all panels and cover plates are secured in place before system operation.

Intra-building Network Connection Requirements

NOTE To protect against intra-building lighting surges, intra-building network connections must use shielded cables that are *grounded at both ends*.

Electrostatic Discharge Hazard to Equipment

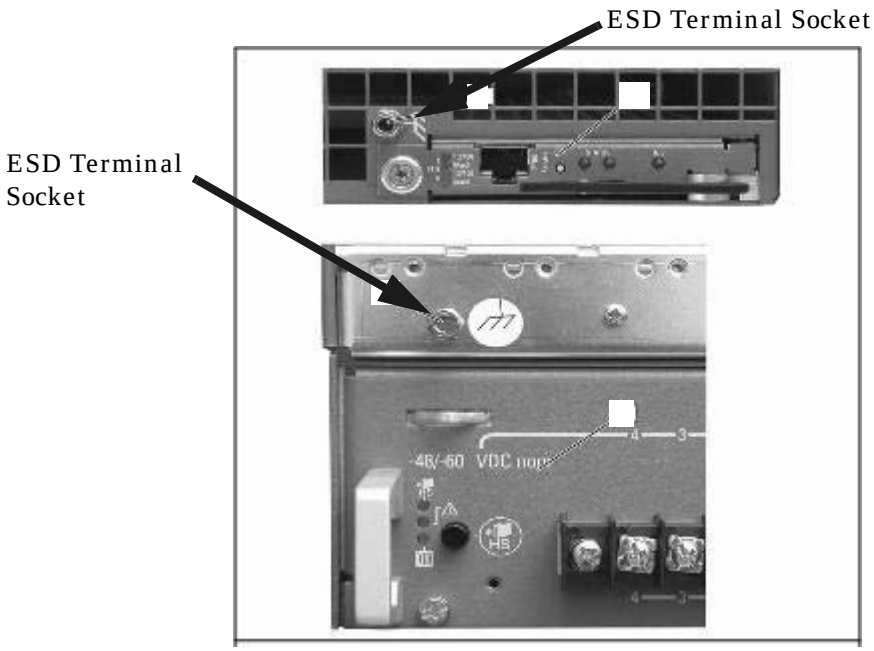
HP systems and peripherals contain assemblies and components that are sensitive to electrostatic discharge (ESD). Carefully observe the precautions and recommended procedures in this guide to prevent component damage from static electricity.

CAUTION Wear an ESD wrist strap that is connected to the same ground potential as the unit you are working on. Connection may be made to any grounded metal assembly in the cabinet. Both you and the electronic devices must be grounded to avoid damage caused by static discharge. If the Shelf is not connected to earth ground, protect the Shelf in an ESD-safe working environment before removing or replacing any field replaceable unit (FRU).

Follow these ESD precautions:

- Prepare an ESD-safe work surface large enough to accommodate the FRUs being handled during servicing. Use a grounding mat and an anti-static wrist strap, such as those included in the ESD Field Service Kit (A3024-80004).
- The anti-static bag that encloses FRUs cannot function as a static dissipating mat. Do not use the anti-static bag for any other purpose than to enclose a product.
- Treat all assemblies, components, and interface connections as static-sensitive.
- Keep FRUs in a conductive plastic bag until they are ready to be installed or shipped for repair.
- Avoid working in carpeted areas, and keep body movement to a minimum while removing and installing FRUs.
- Electrostatic discharge wrist strap grounding connection sockets are provided at the following locations on the 14-Slot Shelf exterior:
  - On the front; in the lower left corner, immediately above the Shelf Manager (Figure 1-4).
  - On the rear; in the lower left corner, immediately above the power entry module (PEM B) (Figure 1-4).

Figure 1-4 ESD Wrist Strap Terminal Locations



2 Unpacking the 14-Slot Shelf

Unpacking the 14-Slot Shelf

This chapter provides information about unpacking and installing the bundled 14-Slot Shelf.

CAUTION To minimize any possibility of physical damage to equipment, ensure that floorspace at the installation site is neat and uncluttered. Ensure that a mechanical lift can be maneuvered in the area to lift the Shelf from the shipping pallet.

HP shipping containers are designed to protect their contents under normal shipping conditions. After the equipment arrives at the installation site, carefully inspect each carton for signs of shipping damage. If the container is damaged, document the damage with photographs and contact the transport carrier immediately.

NOTE The factory provides an installation warranty that is effective from the time the shipment is received until Field Services completes the system installation. Please check all equipment and accessories against the shipping manifest. If any parts or accessories are missing or defective upon receipt, they will be replaced directly from the factory. To request replacement parts, contact the HP representative.

Unpack the 14-Slot Shelf by using the following steps:

Step 1. Use a sharp knife or scissors to cut away any shrink-wrap packaging material that covers the shipping package.

WARNING **All poly strap shipping bands that secure the 14-Slot Shelf packaging are stretched tight and are under tension. Wear eye protection to prevent possible eye injury when cutting the strap, as the strap tension is released, and strap ends recoil outward.**

CAUTION Always cut any shrink wrapping material away from the packing carton; do not physically pull and tear the fabric. Physically pulling the shrink wrapping from the shipping carton without cutting it first may create an electrostatic charge that could damage electronic equipment.

Step 2. Follow the warning above and cut the packaging poly strap banding on the 14-Slot Shelf.

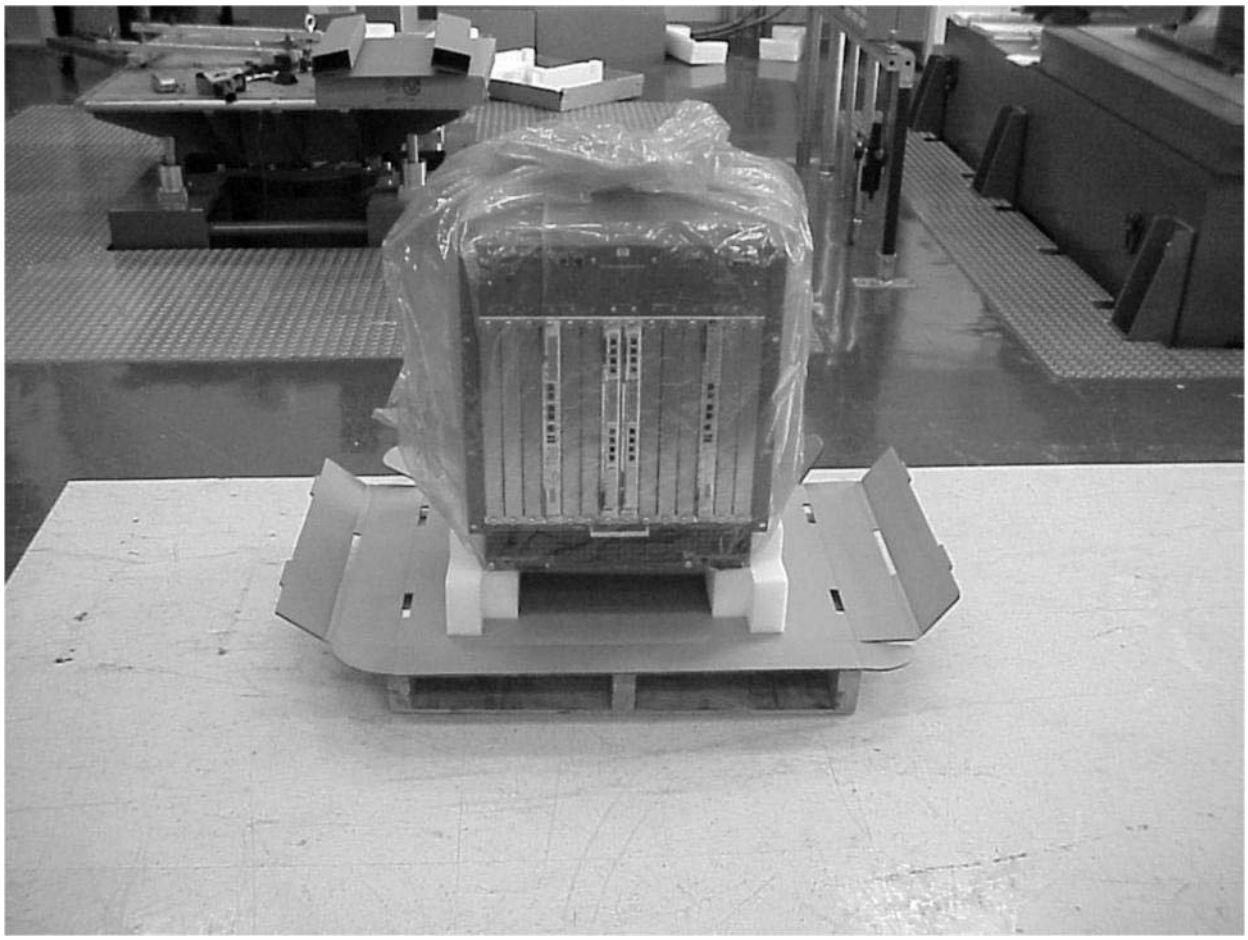
Step 3. Remove the shipping carton and the interior top foam cushions, leaving the 14-Slot Shelf sitting in the corrugated tray. See Figure 2-1 on page 19.

Figure 2-1 Shipping Carton and Top Foam Cushions Removed

Step 4. Remove both the corrugated roll-up spacer and the carton containing the front and rear cable trays along with other important documentation. These are located to either side of the unit. See Figure 2-1.

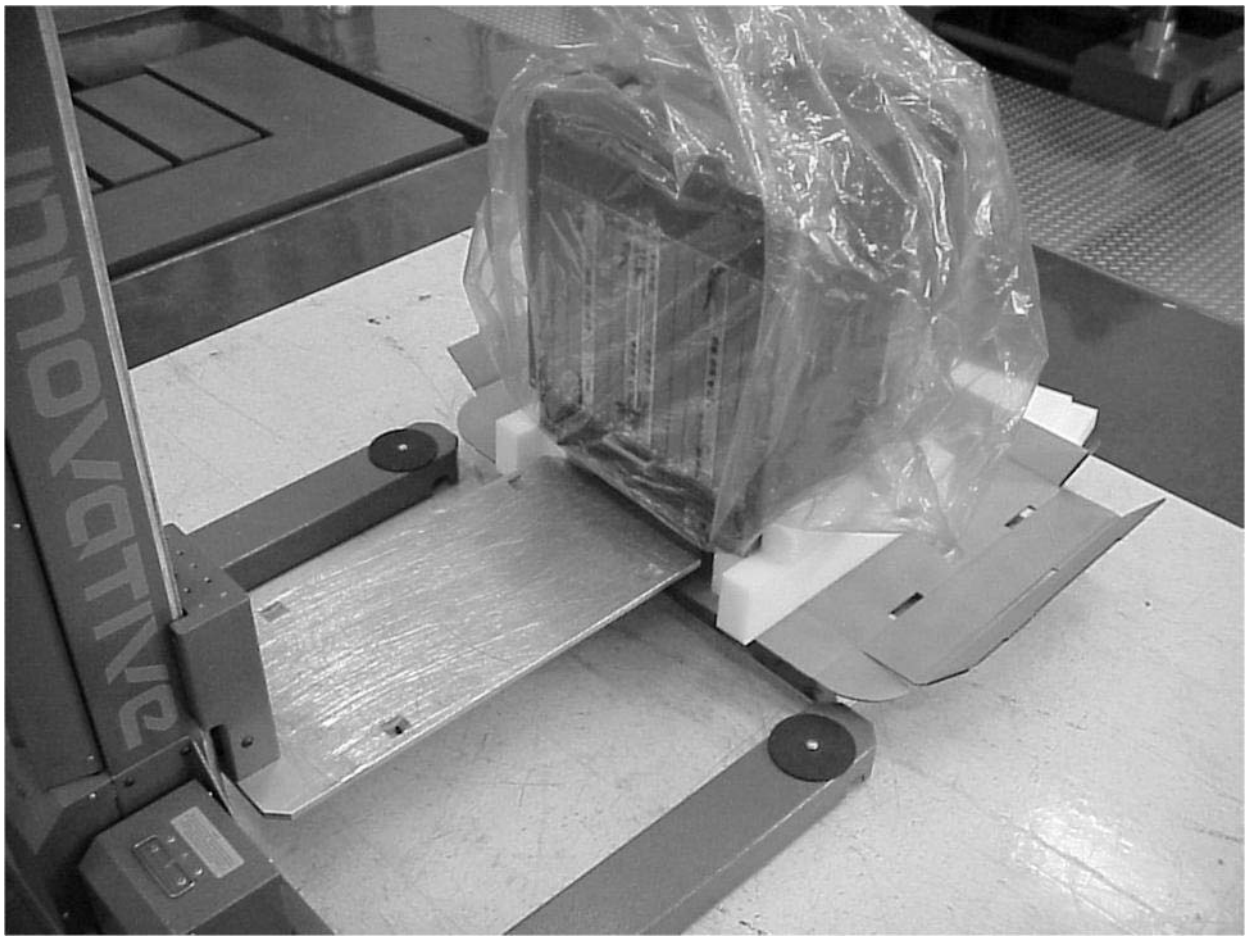
Step 5. Unroll the bottom corrugated tray. See Figure 2-2 on page 20.

Figure 2-2 Bottom Corrogated Tray Unrolled



Step 6. Position the mechanical lift as shown in Figure 2-3 on page 21. The lift should be in line or slightly below the top surface of the bottom foam cushions. If needed, slide the cushions that the unit is resting on outward, a little closer to the edge of the pallet, to allow the lift to slide under the unit.

Figure 2-3 Positioning the Mechanical Lift Under the 14-Slot Shelf

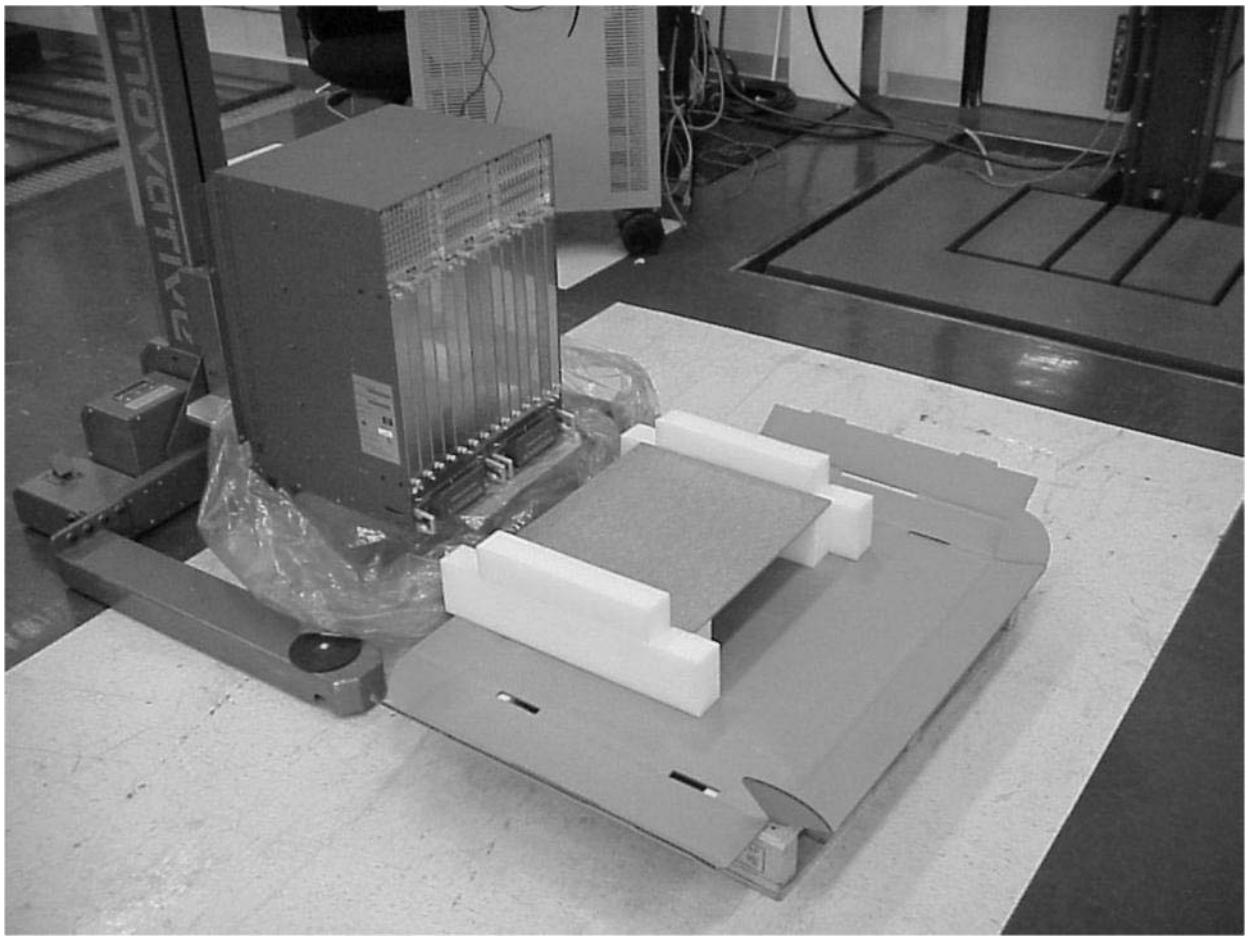


Step 7. Push the 14-Slot Shelf onto the mechanical lift. See Figure 2-4 on page 22.

Figure 2-4 Pushing the Unit Onto the Mechanical Lift

Step 8. Slide the bag down around the server. See Figure 2-5 on page 23. Install cable trays and proceed with the remainder of the installation.

Figure 2-5Ready to Attach the Front and Rear Cable Trays



Step 9. Locate the front and rear cable trays from the accessory package and mount to the Shelf. To mount the cable trays, locate and remove the existing cable tray chassis screws that match the mounting holes for each tray. Reuse these screws to mount the two cable trays. See Figure 2-6 on page 24.

The 14-Slot Shelf is now ready for equipment rack mounting.

Figure 2-6 Mounting the Front Cable Tray

3 Rack Mounting the 14-Slot Shelf

Rack Mounting the 14-Slot Shelf

The HP bh5700 ATCA 14-Slot Blade Server is designed to mount in a 19 in. (48.26 cm) wide, 23.62 in (600 mm) deep, Electronics Industry Alliance (EIA), seismic-rated HP rack. The 14-Slot Shelf is shipped with the rack mounting flanges correctly positioned for mounting into a 4-post seismic-rated equipment rack. This chapter provides detailed procedures for completing the rack mount installation.

Installing the 14-Slot Shelf in a HP EIA Standard Seismic Rack

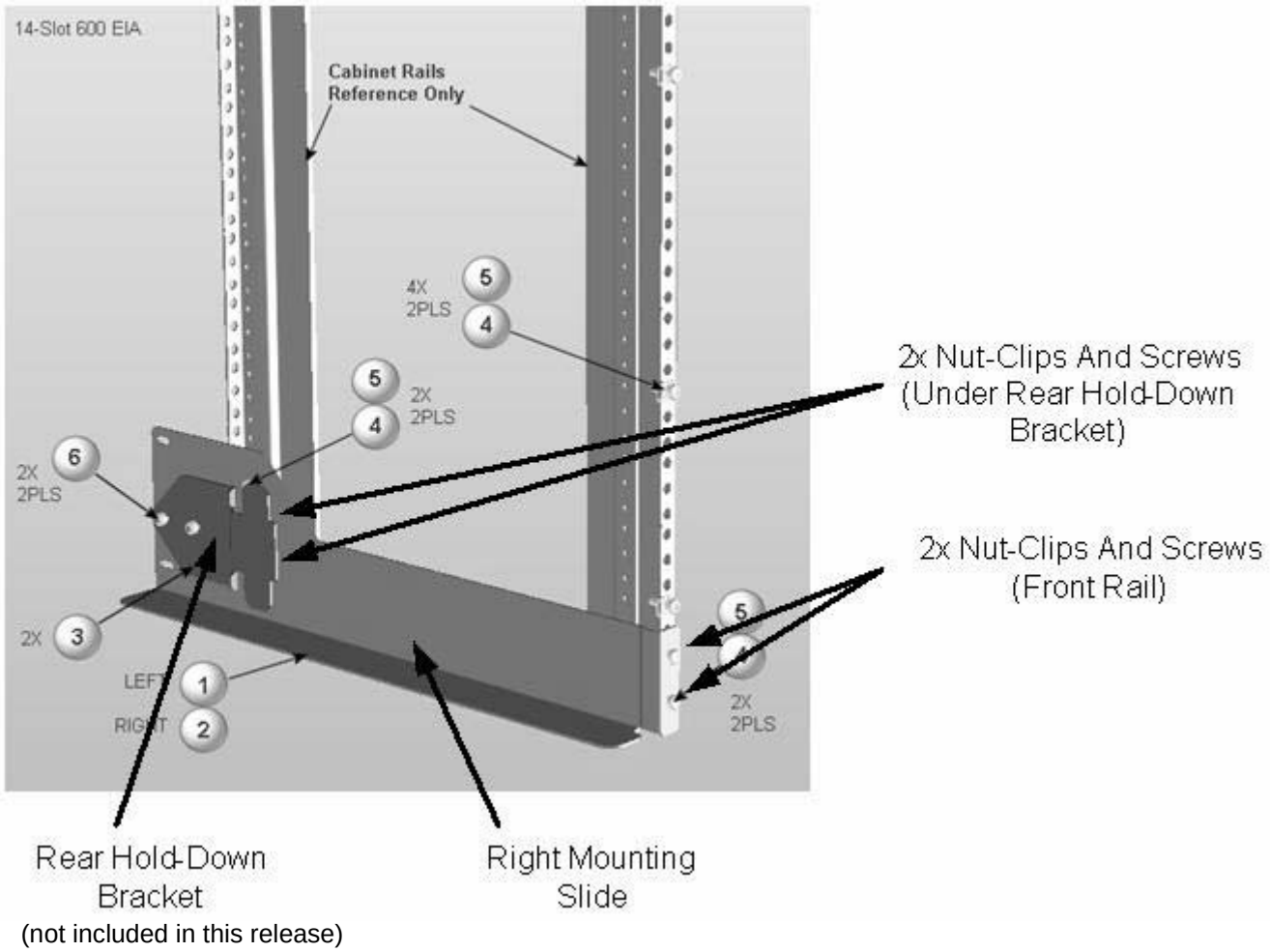
The ATCA 14-Slot Shelf 600 mm EIA Seismic Rack Mount Kit provided with your HP Seismic Rack includes all items required to mount the HP bh5700 ATCA 14-Slot Blade Server into the rack. See Table 3-1 for the contents of the Rack Mount Kit.

Table 3-1 Rack Mount Kit, HP bh5700 ATCA 14-Slot Blade Server, (PN Z7678-60275)

Item Reference	Description
#1, Figure 3-1	Mounting Slide, Rack Left Side (PN Z7678-00290), 1 each
#2, Figure 3-1	Mounting Slide, Rack Right Side (PN Z7678-00301), 1 each
#3, Figure 3-1	Rear Hold-down bracket, (PN Z7678-00291), 2 each (not included in this release)
	Hardware Kit (PN Z7678-80075), 1 each
#4, Figure 3-1	Nut clip, M5x0.8, 16 each
#5, Figure 3-1	Screw, M5x0.8x16 Torx pan with crest cup washer, 16 each
#6, Figure 3-1	Screw, M5x0.8x10 Torx pan with crest cup washer, 4 each

NOTE The rear hold-down brackets (#3, Figure 3-1) are not included with this product release.

Figure 3-1 Mounting Slide Attached to Cabinet Rails (Rear Hold-down Bracket in Place)



IMPORTANT Before installing the Rack Mount Kit, ensure there will be adequate vertical space to install the 14-Slot Shelf (13U chassis height) in addition to other equipment installed.

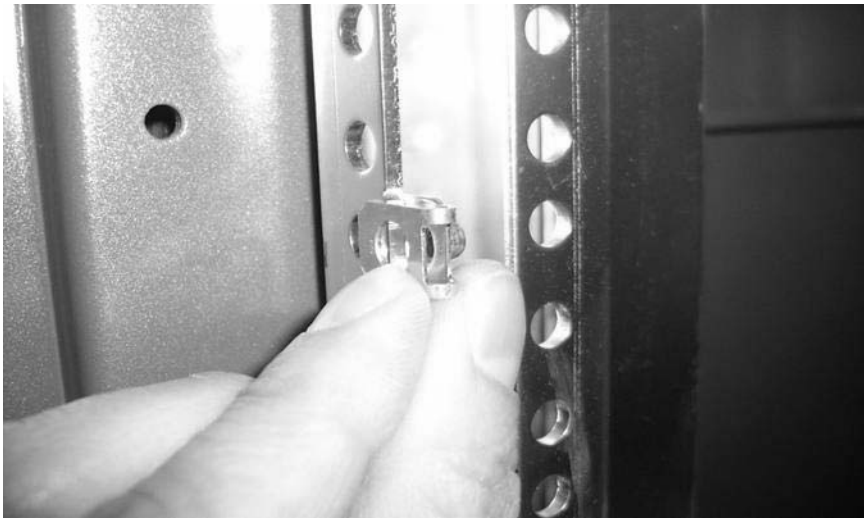
To install the 14-Slot Shelf into the EIA Seismic rack, complete the following steps:

Step 1. Determine where the 14-Slot Shelf chassis will be installed within the seismic rack.

Step 2. Install two nut-clips (Figure 3-2 and item 4, Table 3-1) onto the front cabinet rail in the location where the right mounting slide will be attached (Figure 3-1). Ensure proper spacing of the nut-clips for the mounting slide attachment holes.

Figure 3-2Nut Clip, M5x0.8

Figure 3-3Installing Nut Clip



IMPORTANT The right and left rack mounting slides will support the weight of the 14-Slot Shelf when mounted in the rack.

Step 3. Install two nut-clips onto the rear cabinet rail in positions that correspond to those installed in step 2 on the front cabinet rail. These nut-clips will be used to attach the rear of the right mounting slide (see note below).

Step 4. Install the four nut-clips required to attach the left mounting slide as a mirror image of the right mounting slide (installed in steps 2 and 3).

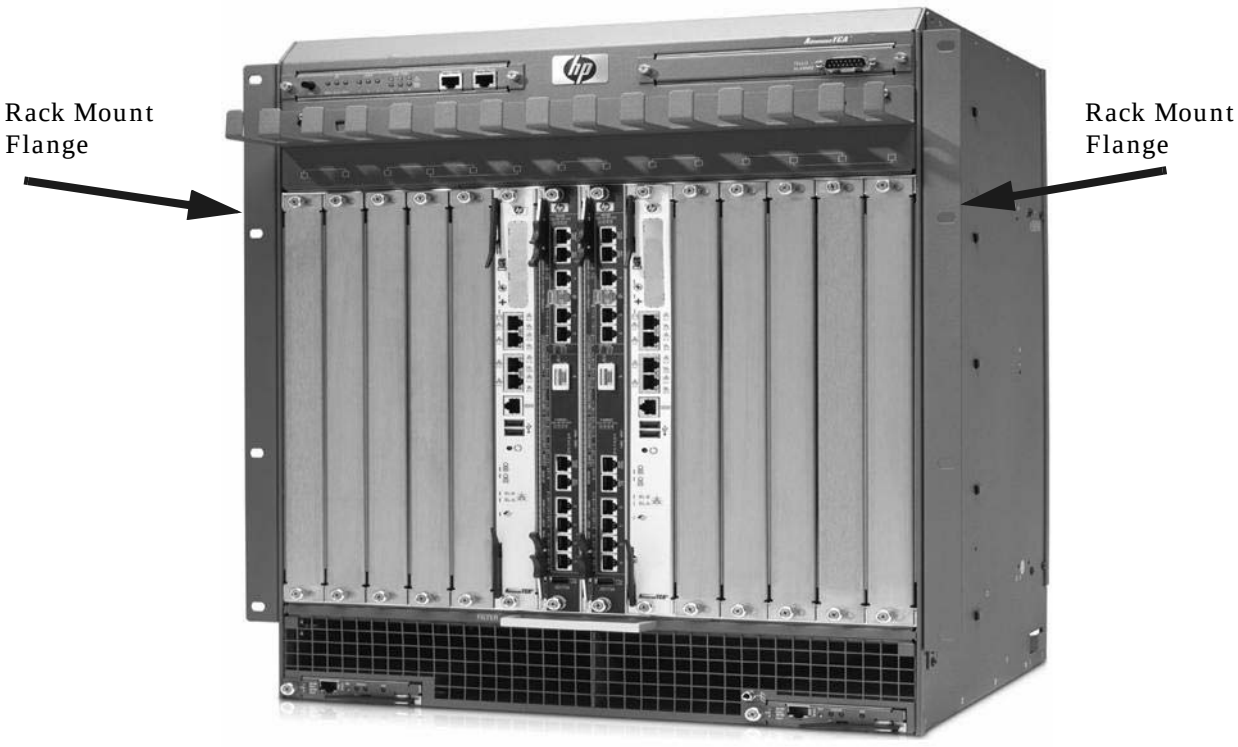
Step 5. Using four M5x0.8x16 screws , attach the right mounting slide to the front and rear cabinet rails as shown in Figure 3-1 on page 27. Use a Torx drive torque wrench to tighten each screw to 36 in-pounds (4.067 N-m).

Figure 3-4M5x0.8x16, Torx Pan Screw, with Crest Cup Washer

Step 6. Using four M5x0.8x16 screws (Figure 3-4), attach the left mounting slide to the front and rear left cabinet rails as a mirror image of the installed right mounting slide shown in Figure 3-1 on page 27. Use a Torx drive torque wrench to tighten each screw to 36 in-pounds (4.067 N-m).

Step 7. On the right and left front cabinet rail, attach four nut-clips on each rail above the installed right mounting slides (Figure 3-1 on page 27) that will match the mounting holes in the 14-Slot Shelf rack mounting flanges (Figure 3-5).

Figure 3-5Front View, 14-Slot Shelf, Rack Mounting Flanges Attached



Step 8. Verify that the 14-Slot Shelf is completely unpacked and its rack mounting flanges are configured for installation into the 4-post seismic rack (see chapter 2, *Unpacking the 14-Slot Shelf*).

WARNING **A 14-Slot Shelf weighs from 62.6 kg (138 lbs) for the basic configuration to 90 kg (200 lbs) with the blade cage fully populated. This is a pinch, crush, and heavy lift hazard.**

Step 9. Place the 14-Slot Shelf on a portable mechanical lift device that can be used to elevate and hold the Shelf in place while it is being installed into the seismic rack.

Step 10. Position the portable lift and 14-Slot Shelf directly in front of the seismic rack, with the rear of the Shelf facing the rack.

Step 11. Raise the Shelf with the lift until the bottom of the 14-Slot Shelf is even with the horizontal surface of the right and left seismic rack mounting slides installed earlier in the seismic rack.

Step 12. Push the 14-Slot Shelf from the portable lift onto the two mounting slides in the seismic rack until the rack mounting flanges on the front of the Shelf meet the right and left front rails of the seismic rack. See Figure 3-5.

Step 13. On the 14-Slot Shelf rack mounting flanges (Figure 3-5), insert the remaining eight M5x0.8x16 screws through the mounting flange holes and into the nut-clips installed previously on the front rails. Use a Torx drive torque wrench to tighten each screw to 36 in-pounds (4.067 N-m).

CAUTION Ensure that filler panels are installed in all empty blade cage slots, front and rear. Missing filler panels or other openings in the 14-Slot Shelf chassis may cause equipment damage due to cooling fan air flow disruption. This is an equipment overheating hazard.

Step 14. This completes the 14-Slot Shelf seismic rack installation process. You are now ready to connect system power and protective ground to the 14-Slot Shelf, as shown in chapter 4.

Mounting the 14-Slot Shelf in a 2-Post Equipment Rack

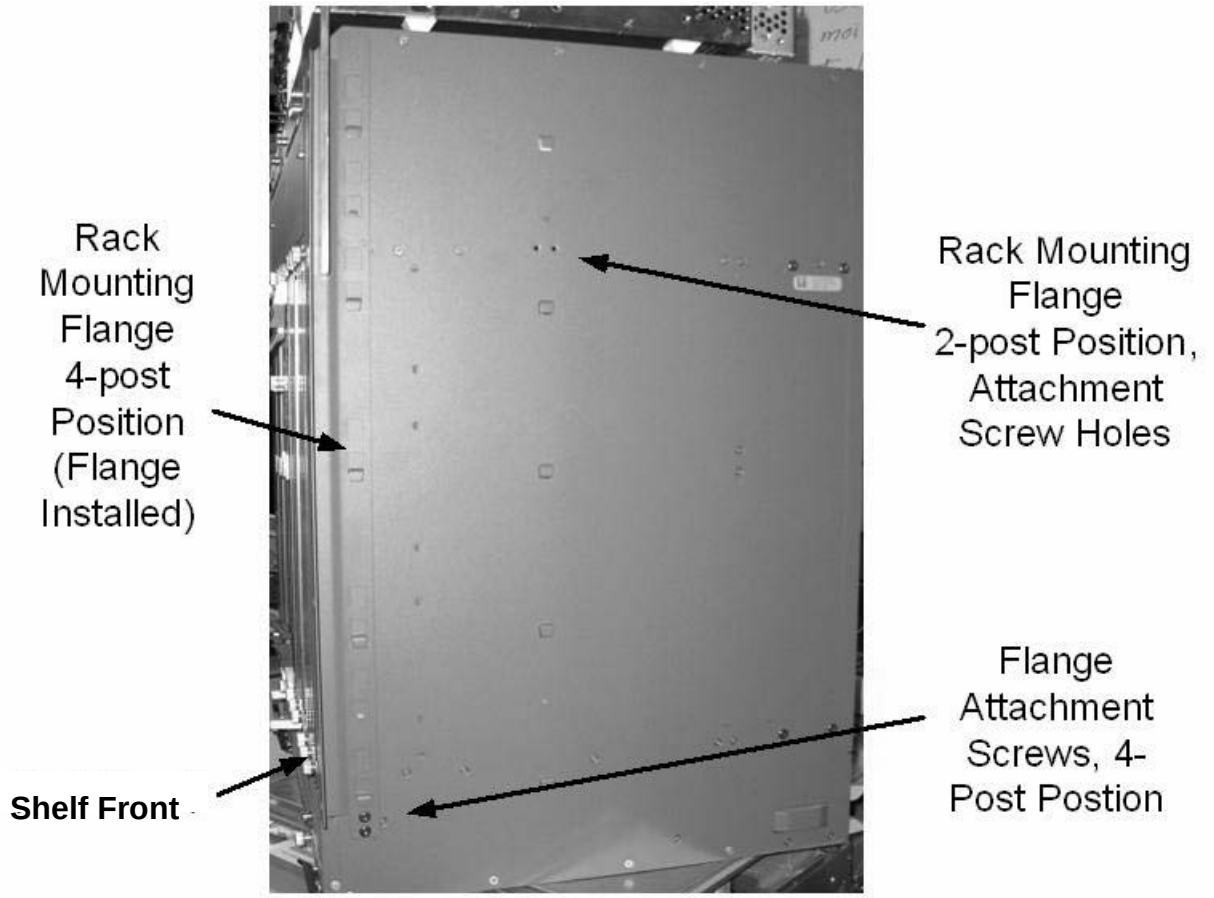
WARNING **A 14-Slot Shelf weighs from 62.6 kg (138 lbs) for the basic configuration to 90 kg (200 lbs) with the blade cage fully populated. Remove all installed blades, fan trays, and power entry modules (PEMs) before attempting to move the 14-Slot Shelf by hand. This is a pinch, crush, and heavy lift hazard.**

IMPORTANT Contact Hewlett Packard for all other information about installing the HP bh5700 ATCA 14-Slot Blade Server into a non-standard or non-Hewlett Packard supported rack.

The 14-Slot Shelf can also be mounted into a 2-post, 48.26 cm (19 in) non-seismic-rated rack. The HP bh5700 ATCA 14-Slot Blade Server rack mounting flanges on each side of the 14-Slot Shelf must be repositioned to mount in a 2-post rack. See the following steps to complete:

Step 1. On the 14-Slot Shelf, remove the two rack mounting flanges from the 4-post mounting position by first removing the lower two screws that secure each flange to the Shelf side panels (see Figure 3-6).

Figure 3-6Flange Mounting Positions for 2- and 4-Post Equipment Racks


Rack Mounting Flange 4-post Position (Flange Installed)
Rack Mounting Flange 2-post Position, Attachment Screw Holes
Flange Attachment Screws, 4-Post Postion
Shelf Front

Step 2. Slide each flange downward until the flange drops out of the five retaining clips that hold the flanges to the side panels.

Step 3. Reposition each flange over the five retaining clips for the 2-post mounting position (Figure 3-6), with the clips protruding into the openings in the flange.

Step 4. Slide each flange upward until the flanges are securely seated under the retaining clips.

NOTE The rack mounting flanges remain vertical for the 2-post rack mount. They are positioned approximately 5 in. behind the 4-post mount location of the shelf. See Figure 3-6.

Step 5. On the 14-Slot Shelf, secure the flange at the upper screw holes using the two screws removed from the bottom of the flange of the 4-post mounting position. Repeat steps 1—5 for other side flange.

Rack Mounting the 14-Slot Shelf

4 Connecting Protective Earth Ground and External Power to the Shelf

Connecting Protective Earth Ground and External Power to the Shelf

This chapter provides information on connecting protective earth ground and external system power to the installed 14-Slot Shelf.

WARNING **Disconnect all power cords to completely remove power. This is a shock hazard.**

IMPORTANT Overcurrent protection for the system must be provided at the installation site at not less than 125% of the load for each supply circuit. Due to safety issues when servicing the system, only one blade should be removed at a time and any slots not containing a blade must have a cover plate installed.

NOTE System DC power requirements are located on the side of the ATCA chassis. HP PN: AD171-2000A on the power label is equivalent to the FCLSB-0602.

Connecting the Shelf to Earth Ground

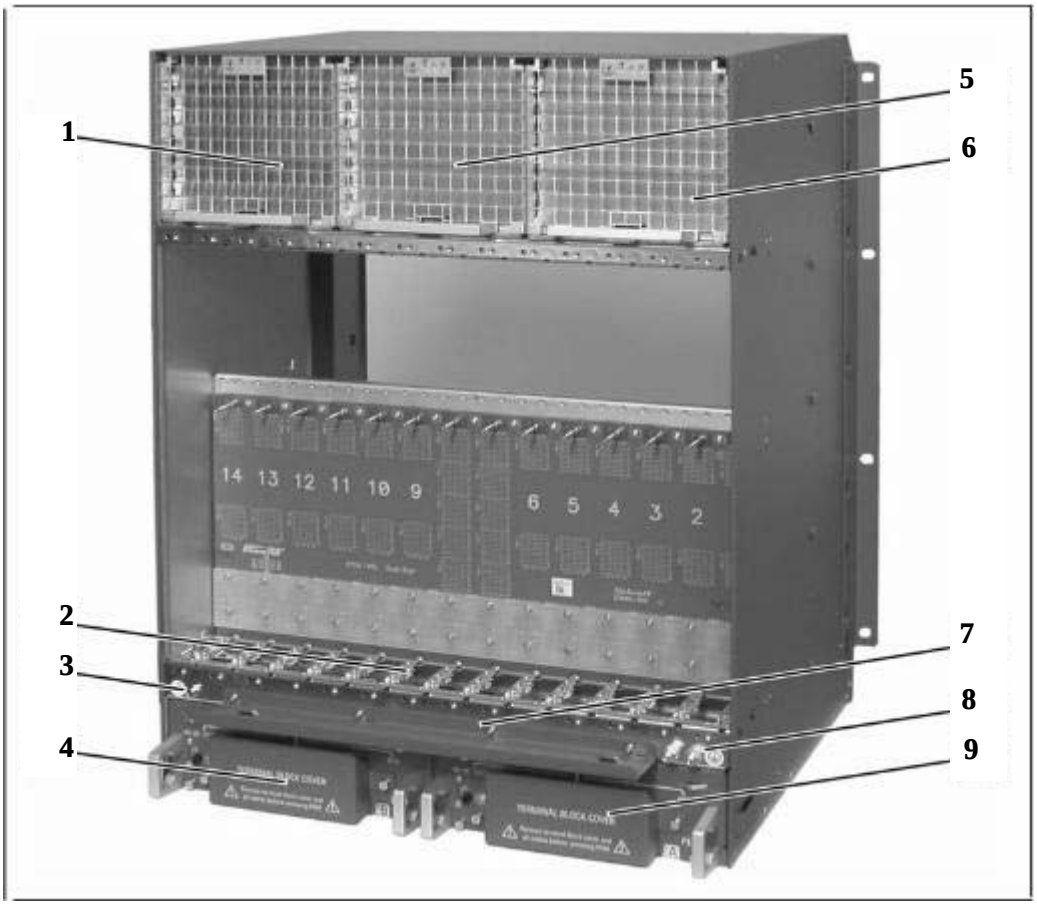
WARNING **Protective ground must be connected to the 14-Slot Shelf before connecting any external power. This is a high voltage hazard if not connected.**

On the right-rear of the 14-Slot Shelf, connect an earth grounding cable to the two grounding lugs located above the power entry module A (PEM A). See Figure 4-1 and Figure 4-2.

Recommended minimum specifications for the grounding cable and its connection include the following:

- Recommended Minimum Wire Size: AWG6
- Recommended Terminals: Use only double lug terminals, with a 45^{o} angle.

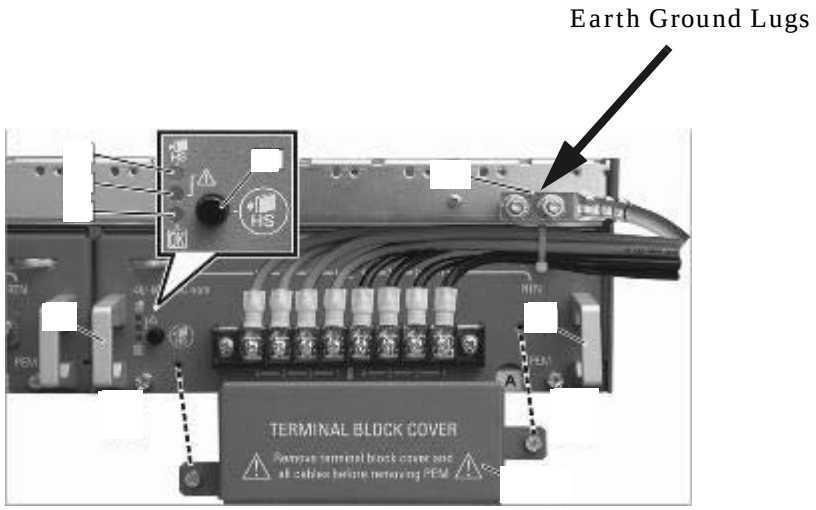
Figure 4-1 Earth Ground Lugs and PEM Location on Shelf Rear (Numbers 8, 4, & 9)



Use the following list to identify the callouts from Figure 4-1:

1. Fan tray #2
2. Rear card cage
3. ESD wrist strap terminal
4. Power entry module (PEM B)
5. Fan tray #1
6. Fan tray #0
7. Rear cable tray
8. Shelf ground terminal
9. Power entry module (PEM A)

Figure 4-2 Earth Ground Lug Detail, Shelf Lower Right Rear



Verifying the Power Supply Output

WARNING	**Observe all electrical hazard safety procedures when verifying the external power supply voltages. Failure to comply can result in personal injury.**

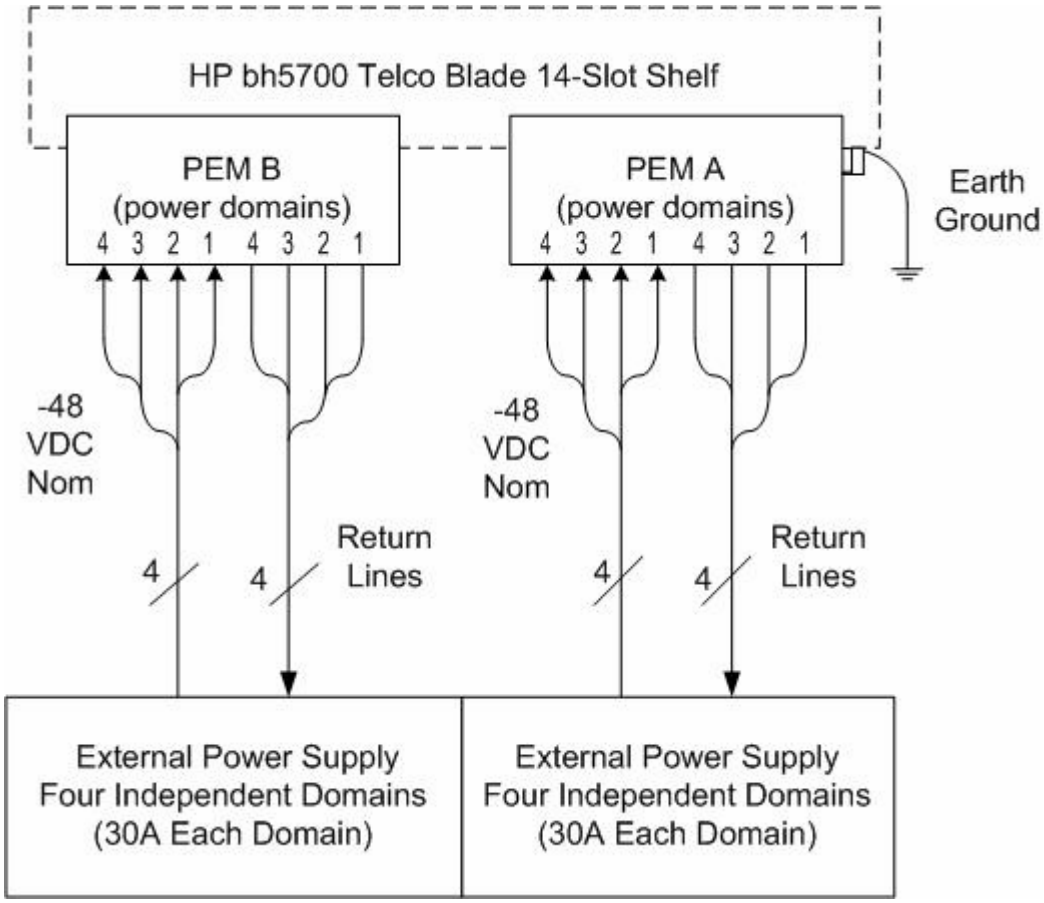
CAUTION	All input power and return wiring should be specified, configure, and installed by a qualified electrician in order to prevent damage to the equipment.

CAUTION	Output voltages from the external power supply must be verified before power leads are connected to the 14-Slot Shelf PEMs. Failure to verify can damage the Shelf and will require replacement of affected components.

Measure the output voltage between each output power lead and earth ground on the external power supplies. The supplied voltage must be between -37 and -72 VDC (Nominal -48V).

See Figure 4-3 for a simplified block diagram of a typical external power supply configuration.

Figure 4-3 Typical High Availability Power Connection Block Diagram



Minimum Power Connection Cable Specifications

CAUTION All input power and return wiring should be specified, configure, and installed by a qualified electrician in order to prevent damage to the equipment.

The following are the recommended minimum specifications for input power and return cables:

- Cable Size:
  - — Diameter of 6 mm^2 respective, AWG10.
  - — Maximum length of 2.5 to 3.0m.
  - — Suitable for 30A at 50^oC ambient temperature.
- Required Terminals: Use ring terminals for screw M3.5. Maximum outside diameter is 9.5 mm.

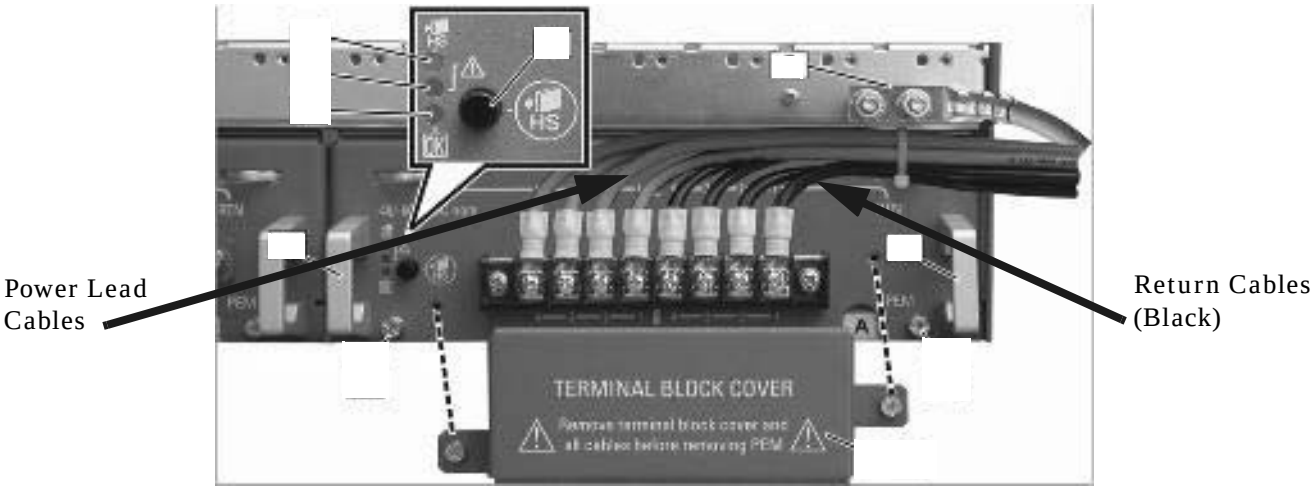
Connecting the Power and Return Cables

WARNING **Ensure that each power domain supply circuit breaker is switched *OFF* while completing the following power connection procedure. Failure to comply can result in personal injury.**

To connect external power and voltage return (VRTN) leads to the 14-Slot Shelf, complete the following steps:

Step 1. On the rear of the 14-Slot Shelf, remove the PEM A Terminal Block Cover and connect the four PEM A independent domain power cables and four return lines as shown in Figure 4-4. The four cables and terminals on the left are the power domain leads, and the four cables and terminals on the right are the return lines for the PEM.

Figure 4-4 PEM Power Lead and Return (RTN) Connections



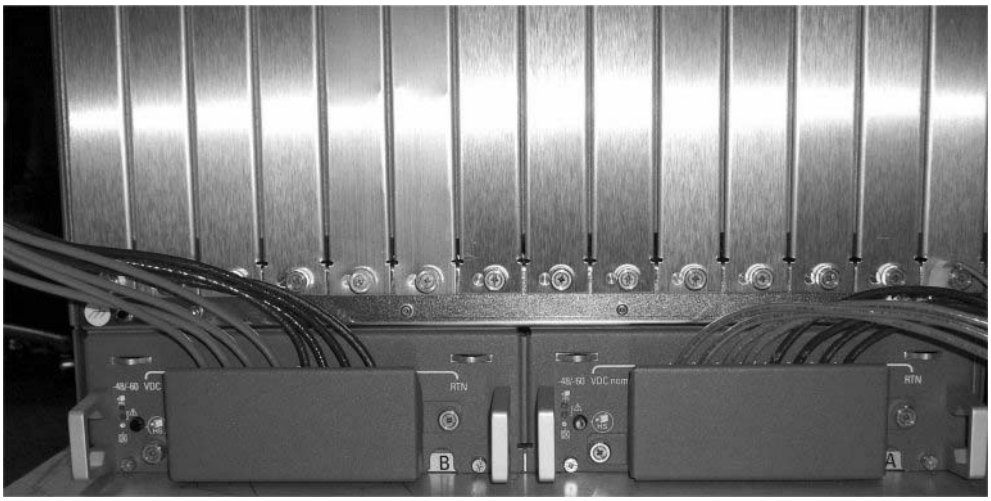
CAUTION Make certain to connect matching power supply domain 1 lead to power domain 1 terminal lug on the PEM, matching lead 2 to terminal lug 2, and so on. Also ensure that power domain VRTN lines are matched to respective connections on each PEM. See Figure 4-4 and Figure 4-5.

NOTE In a typical telecommunications environment, the VRTN path of the -48 VDC supply is grounded to protective earth (PE) of the building.

Step 2. Replace and secure the PEM A terminal block cover when all power leads and VRTN lines have been attached.

Step 3. Remove the PEM B terminal block cover (see Figure 4-5) and connect the four PEM B independent domain power leads and VRTN lines from the redundant power supply, using the same procedure as above, for PEM A.

Figure 4-5 Typical PEM Power Cable Connection Layout



Step 4. On PEM B, replace and secure the PEM B terminal block cover.

WARNING **When external power is applied, the 14-Slot Shelf is energized at all times. Power to the 14-Slot Shelf is controlled only from the external power source, and cannot be switched off at the 14-Slot Shelf. Failure to observe can result in personal injury.**

Step 5. The 14-Slot Shelf is now ready to receive system power.

Connecting Protective Earth Ground and External Power to the Shelf

5 Installing 14-Slot Shelf Components

Installing 14-Slot Shelf Components

This chapter provides information for installing memory modules into the HP bc2100 ATCA Server Blade.

Server Blade Memory Modules

The HP bc2100 ATCA Server Blade Dual In-line Memory Modules (DIMMs) are always installed in pairs. Each individual DIMM within a pair must also be identical in storage capacity, revision, and part number. The current DIMM configurations supported by Hewlett-Packard include any of the following:

- Two 1–GB DIMMs (2 GB)
- Four 1–GB DIMMs (4 GB)
- Two 2–GB DIMMs (4 GB)
- Four 2–GB DIMMs (8 GB)

This section provides information on removing and replacing the DIMMs in an HP bc2100 ATCA Server Blade.

Removing the DIMMs

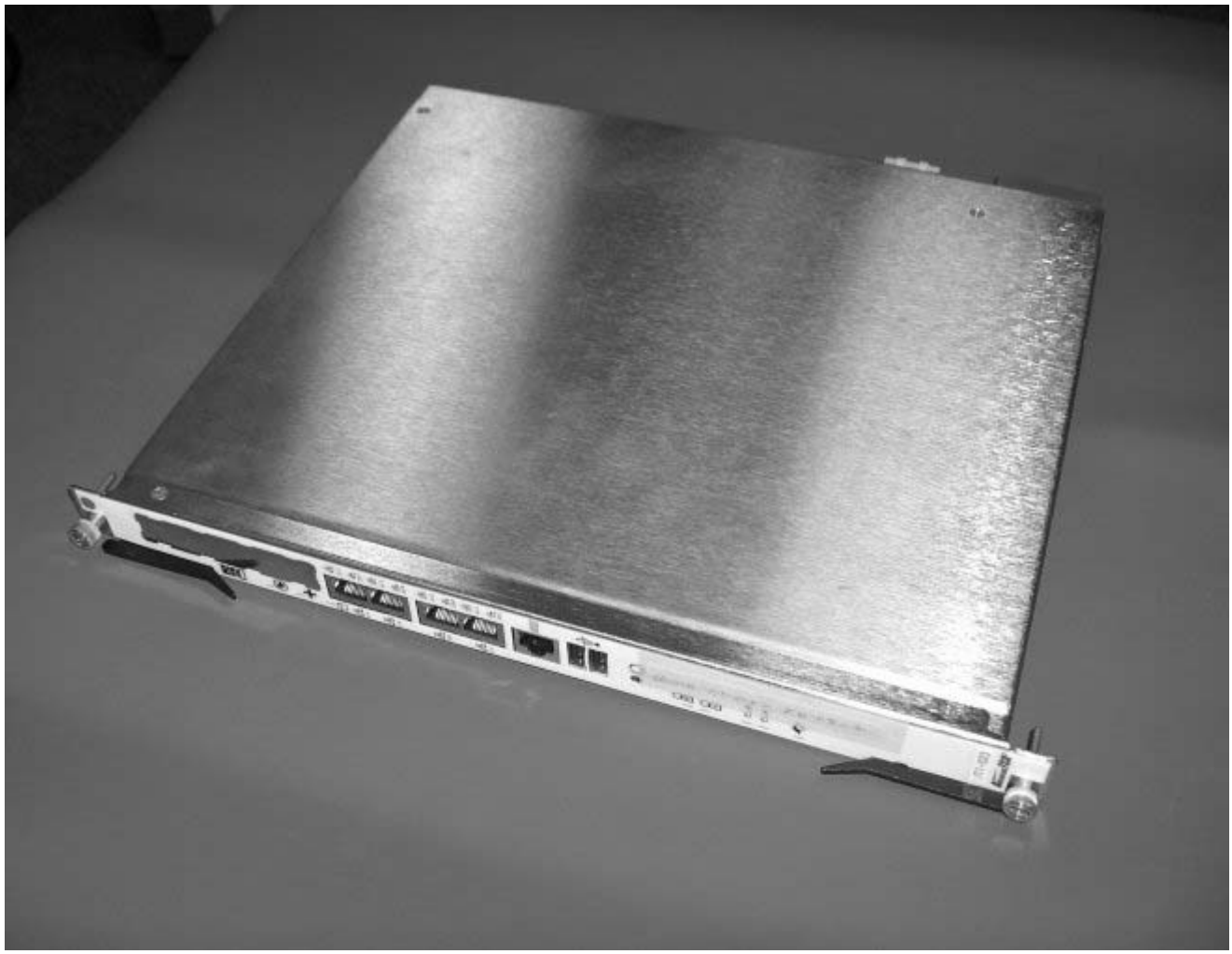
To remove mounted DIMMs from the Server Blade, complete the following steps:

CAUTION Observe all ESD safety precautions while completing this procedure. Failure to follow ESD saftey precautions could result in damage to the 14-Slot Shelf and equipment.

Step 1. Following hot-swap procedures, remove the HP bc2100 ATCA Server Blade from the 14-Slot Shelf.

Step 2. Lay the Server Blade flat on an anti-static working surface and position the blade front panel facing you. Ensure that the backplane connector (blue color) is facing away from you and is on the right side of the blade as it lays flat (see Figure 5-1 on page 43).

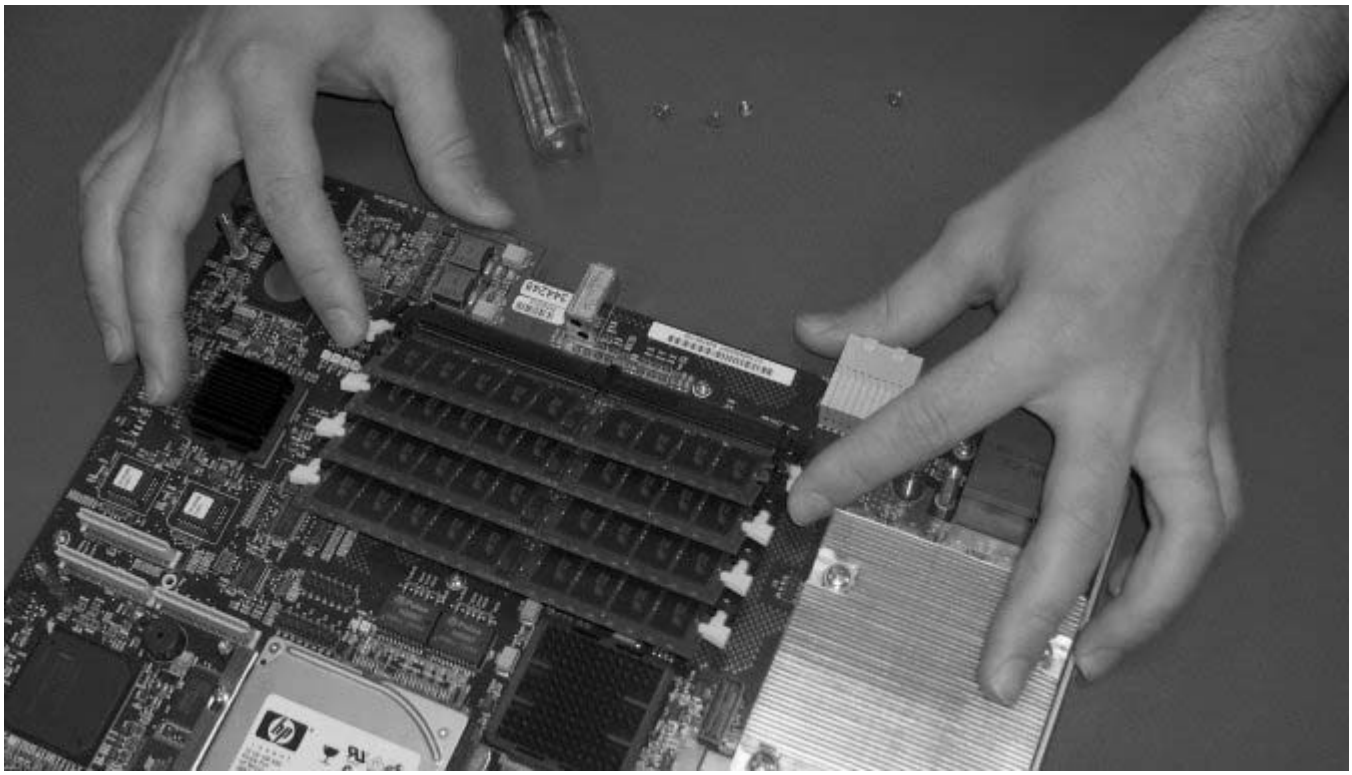
Figure 5-1 Server Blade with Access Cover Panel Installed



Step 3. Remove the countersunk retaining screws that secure the blade access cover panel and remove the cover panel. Set the cover panel and retaining screws aside for reuse.

Step 4. To release the DIMM from its socket, pull the sockets end levers away from the memory module (see Figure 5-2 on page 44).

Figure 5-2 Releasing the DIMM from DIMM Socket U5



Step 5. Grasp the memory module and remove by angling away from the socket. Place the DIMM in a static-safe location.

Step 6. Repeat steps 4 and 5 to remove any remaining DIMMs. Place each memory module in a static-safe location.

Replacing the Memory Modules

CAUTION Observe all ESD safety precautions while completing this procedure. Failure to follow ESD safety precautions can result in damage to the 14-Slot Shelf and equipment.

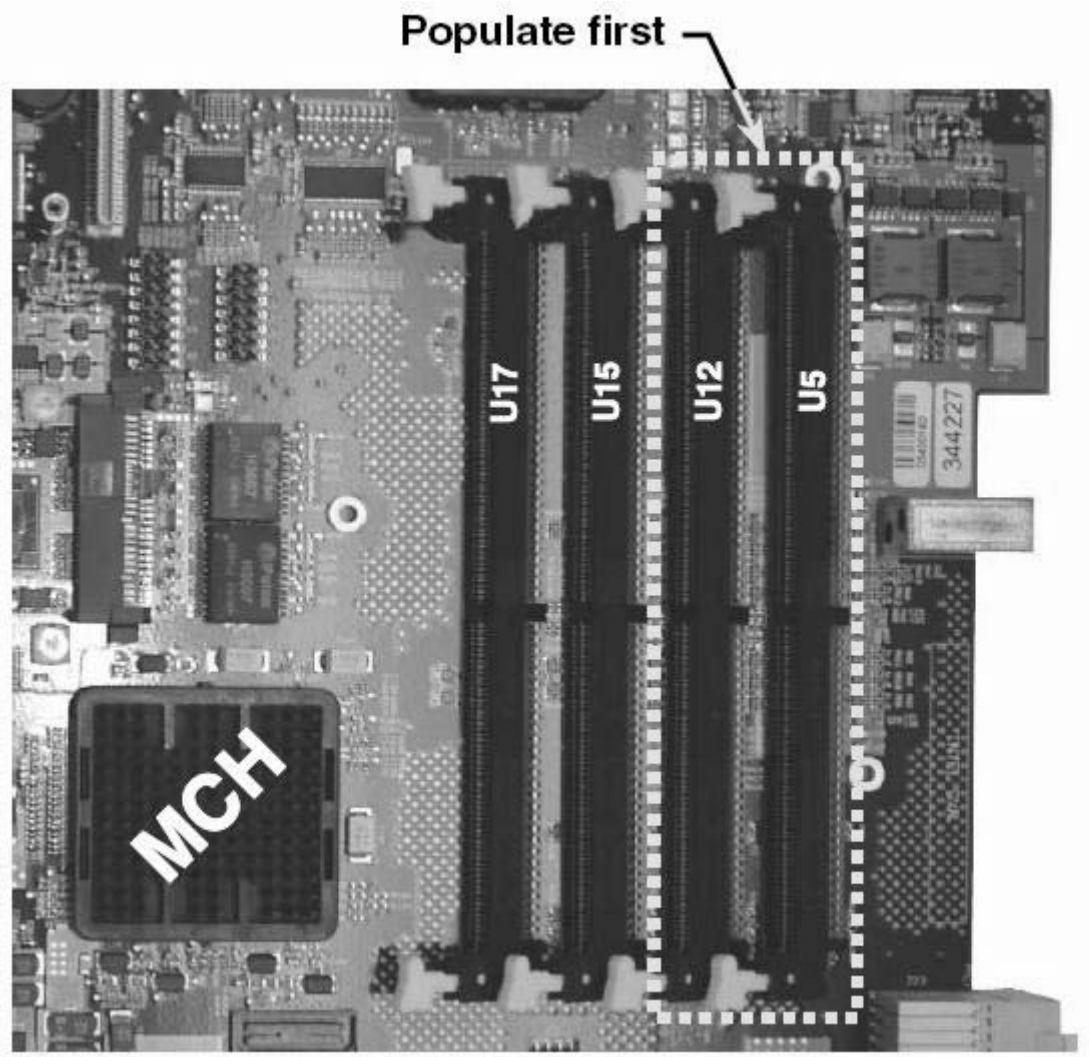
CAUTION Each DIMM is keyed . Ensure the memory module is indexed correctly before seating into a DIMM socket. Failure to observe will damage the DIMM and the socket, requiring replacement of the Server Blade and the affected DIMM.

CAUTION The DIMMs must be replaced in pairs. Each individual DIMM must be identical in storage capacity, revision, and part number. The current DIMM configurations supported by HP include any of the following:

- Two 1–GB DIMMs (2 GB)
- Four 1–GB DIMMs (4 GB)
- Two 2–GB DIMMs (4 GB)
- Four 2–GB DIMMs (8 GB)

IMPORTANT DIMM sockets *U5* and *U12* are always populated. See Figure 5-3.

Figure 5-3 DIMM Socket Assignments



If loading one DIMM pair only, begin by loading the selected DIMM into DIMM socket U12 first. This will ease the installation of the second DIMM into DIMM socket U5.

If you are populating all four DIMM sockets, load DIMM socket U17 first. Load DIMM socket U15 next before loading DIMM socket U12 and finish by loading DIMM socket U5 last.

Step 1. Angle a selected DIMM over an empty DIMM socket.

Step 2. Correctly orient the key and press down evenly to seat the DIMM into the socket.

Step 3. The DIMM socket levers will rise to secure the DIMM. Pull each lever against the side of the DIMM to ensure it is seated.

Step 4. Repeat steps 1 through 3 to load the remaining DIMM(s).

Step 5. Reinstall the Server Blade access cover. Fasten the cover with the screws retained earlier.

This completes the DIMM replacement procedure.

6 14-Slot Shelf Startup

14-Slot Shelf Startup

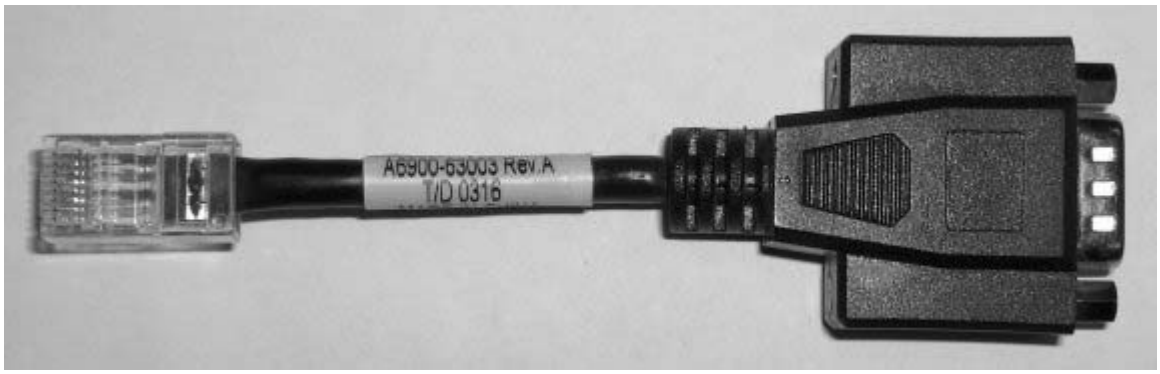
This chapter provides information required to:

- Access the local serial console ports of the HP bh5700 ATCA 14-Slot Blade Server.
- Determine firmware release versions for the major components in the 14-Slot Shelf.
- Validate and update the 14-Slot Shelf firmware.
- Choose and install an operating system on the HP bc2100 ATCA Server Blades in your HP bh5700 ATCA 14-Slot Blade Server.
- Understand the default startup virtual local area network (VLAN) topology that was embedded before your 14-Slot Shelf was shipped from the factory.
- Enable remote firmware update and diagnostic support for the HP bc2100 ATCA Server Blade.

Local Serial Console Port Access

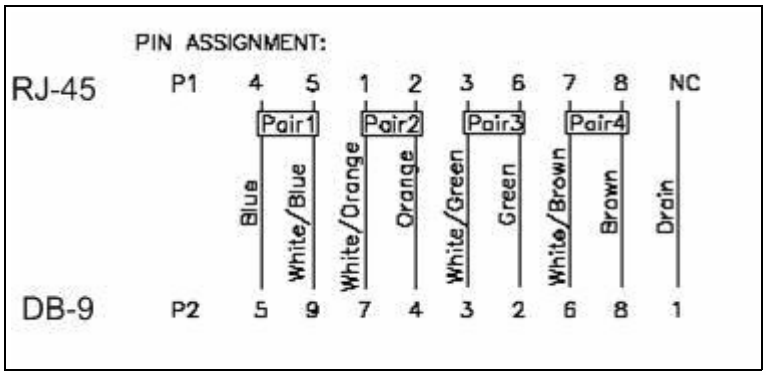
Local serial console access to the major components of the 14-Slot Shelf is provided by a series of serial ports on the front of the shelf for the ShMMs, and on the front panel of each installed blade. You must use an RJ-45/DB-9 adapter cable (Figure 6-1) in combination with a modem eliminator cable that has a DB-9 *female* connector on each end in order to connect your terminal or laptop computer to any of the local serial ports on the 14-Slot Shelf and installed components.

Figure 6-1 RJ-45/DB-9 Adapter Cable, PN A6800-63006



Pin assignments for the RJ-45/DB-9 Adapter Cable connectors are provided in Figure 6-2 on page 49.

Figure 6-2 RJ-45/DB-9 Adapter Pin Assignments



The Shelf Manager (ShMM) Serial Ports

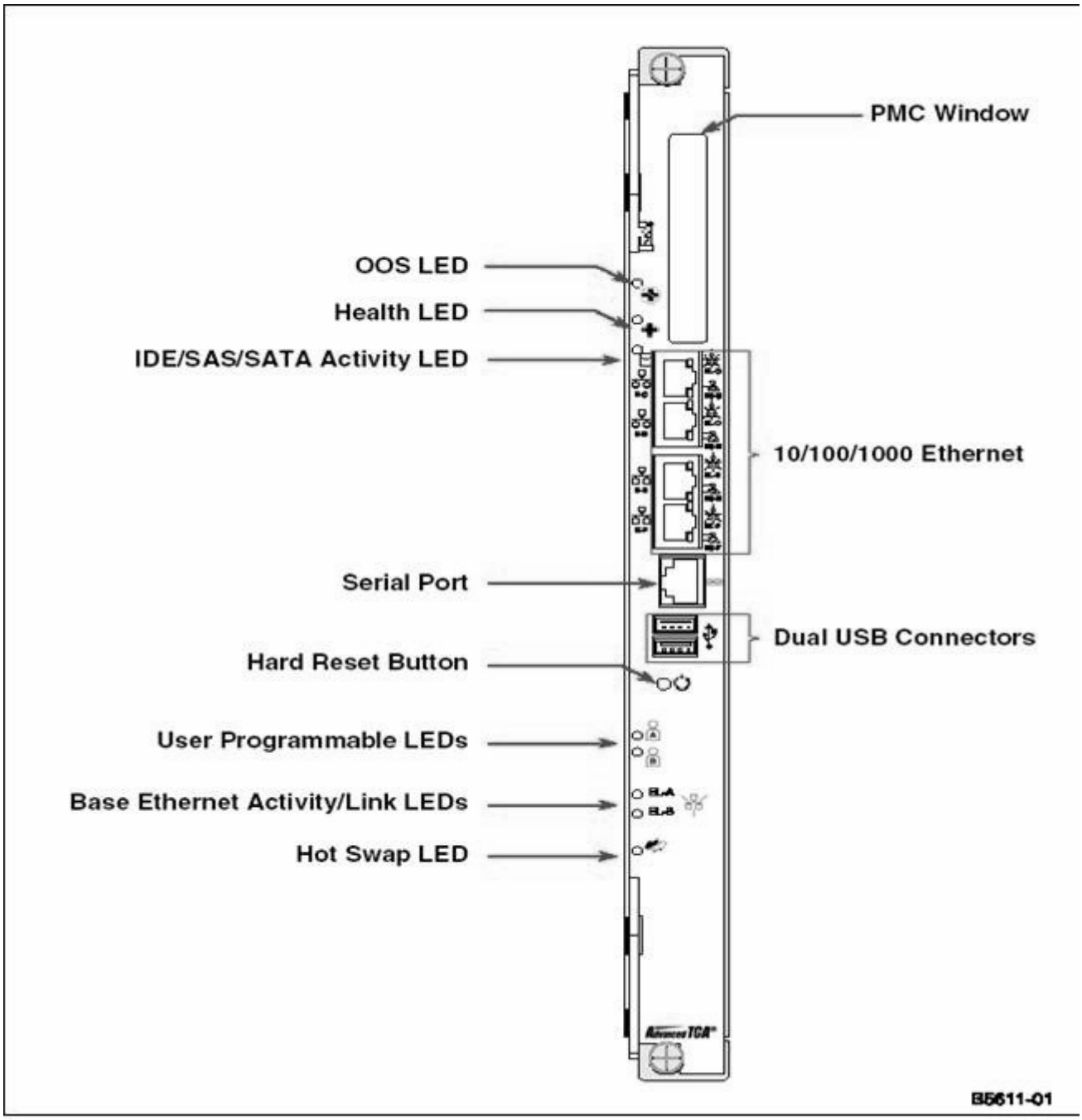
A serial RJ-45 port to each ShMM is located on the Alarm Display Panel. The Alarm Display Panel is located on the upper-left front of the 14-Slot Shelf, and contains one serial port for the left ShMM and a second port for the right ShMM (see Figure 6-3). The RJ-45/DB-9 adapter cable connects into these ports.

Figure 6-3 Shelf Manager Serial Ports on the Alarm Display Panel

The HP bc2100 ATCA Server Blade Serial Port

An RJ-45 serial port is provided on the front panel of each HP bc2100 ATCA Server Blade, as shown in Figure 6-4 on page 50. The RJ-45/DB-9 adapter cable connects into this port.

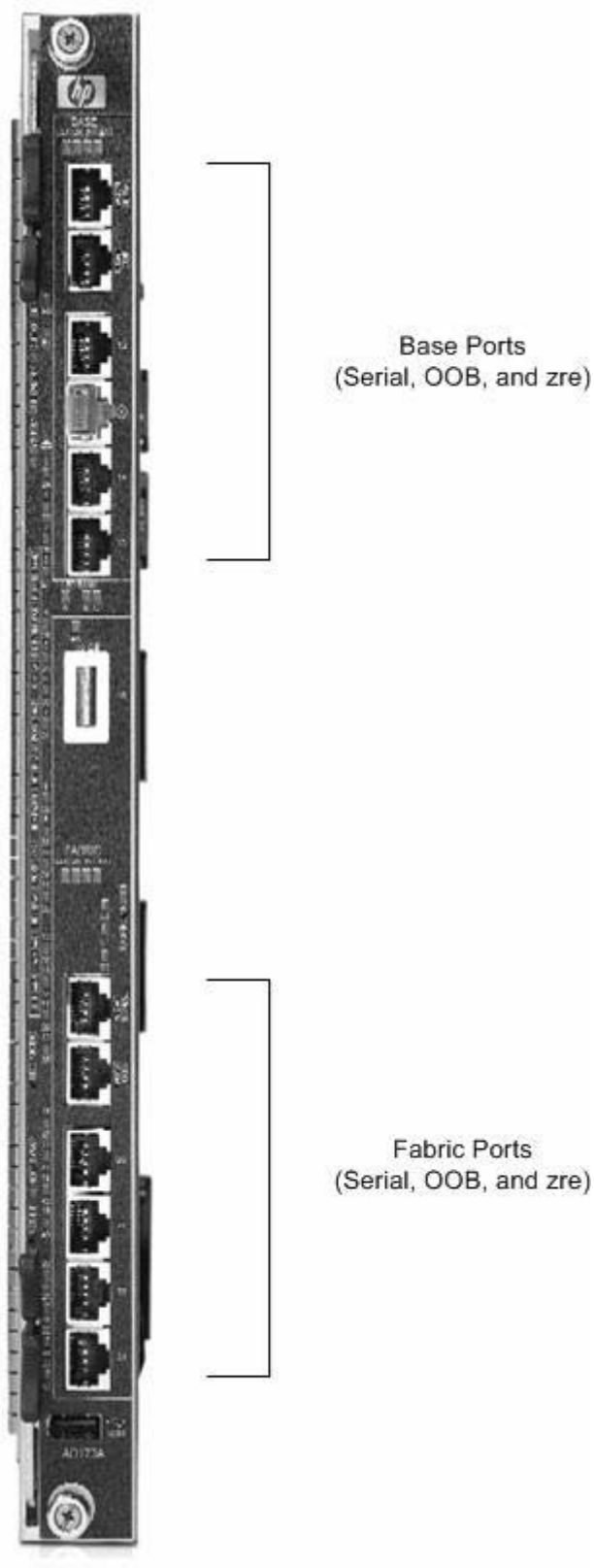
Figure 6-4 HP bc2100 ATCA Server Blade Serial Port



The Ethernet Switch Blade Serial Ports

A separate RJ-45 serial port is provided for both base and fabric access on the front panel of each Ethernet Switch Blade. As shown in Figure 6-5 on page 51, the base serial port is the first port at the top of the base port series, and the fabric serial port is the fist port at the top of the fabric port series. The RJ-45/DB-9 adapter cable connects into these ports for local console access.

Figure 6-5 Ethernet Switch Blade Serial Ports



Determining Firmware Versions

Before beginning normal operation with your HP bh5700 ATCA 14-Slot Blade Server, you should determine the version of the firmware currently installed within each major component of your 14-Slot Shelf, including each ShMM, each HP bc2100 ATCA Server Blade, and each Ethernet Switch Blade. When you have determined the actual firmware release version for each major component, you can then validate your firmware by comparing it to the versions currently available from HP, and updating your firmware where needed.

The ShMM Firmware

To determine the release date and version of the firmware in a ShMM, complete the following:

Step 1. Ensure that power is applied to the 14-Slot Shelf.

Step 2. Connect your PC or laptop computer to the serial port for the respective ShMM (located on the alert display panel). Activate a terminal emulator (9600 baud, 8 data bits, no parity, 1 stop bit) on your PC or laptop computer, and bring up the ShMM console screen.

Step 3. From the Linux prompt (#) on the ShMM console screen, enter the following command and record the printed results as shown in the following example:

```
# version -c

Active firmware revisions:
--------------------------
U-Boot 1.1.2
MIPS Linux-2.4.26
63998-04957.RFS
Alternate firmware revisions
----------------------------
U-Boot 1.1.2
MIPS Linux-2.4.26
63998-04957.RFS

#
```

Step 4. Record this firmware information received for the first ShMM, making certain to note which ShMM this particular firmware data is for.

Step 5. Repeat this procedure for the other ShMM in your 14-Slot Shelf and record that data, making certain to identify which ShMM the data is for. Set these recorded data aside to be used to validate your firmware against the most current release.

The HP bc2100 ATCA Server Blade Firmware

To determine the release date and version of the firmware in a Server Blade, complete the following:

Step 1. Ensure that power is applied to the 14-Slot Shelf.

Step 2. Connect your PC or laptop computer to the Server Blade serial port, activate a terminal emulator (9600 baud, 8 data bits, no parity, 1 stop bit) on your PC or laptop computer, and access the Server Blade console screen.

Step 3. With the console screen displayed, cause the Server Blade to reboot. To cause a reboot you can either cycle power to the 14-Slot Shelf, or remove and reinstall (following hot swap procedures) the respective Server Blade.

Approximately 17 seconds following the start of the boot process, the first Server Blade BIOS message will appear on the console display as the BIOS begins to execute.

Step 4. Interrupt the BIOS execution by entering the `delete` character from your laptop computer or PC keyboard. This will halt the BIOS execution and display the main BIOS screen.

Step 5. Record the following information from the main BIOS screen:

```
AMIBIOS: <Version>
```

From the `Advanced->System Management` screen, record the following information:

```
BMC Device ID
BMC Firmware Revision

BMC Revision
```

Step 6. Set this recorded information aside, making certain to note which Server Blade the information relates to.

Step 7. Repeat this procedure for each HP bc2100 ATCA Server Blade installed in the 14-Slot Shelf.

Step 8. Set these recorded data aside to be used to validate your firmware against the most current release.

Ethernet Switch Blade Firmware

Each Ethernet Switch Blade has separate firmware for the base and the fabric sections of the Switch Blade. There are also separate serial ports for the base and fabric sections, which must be queried individually in order to determine both the installed base and fabric firmware release version.

To determine the release date and version of the base and fabric firmware in a Server Blade, complete the following:

Step 1. Ensure that power is applied to the 14-Slot Shelf.

Step 2. Connect your PC or laptop computer to either the base or fabric serial port for the respective Switch Blade. Note that base and fabric each have separate firmware that must be accessed through separate serial ports.

Step 3. Activate a terminal emulator (9600 baud, 8 data bits, no parity, 1 stop bit) on your PC or laptop computer, and bring up the Switch Blade console screen.

IMPORTANT Firmware versions must be recorded for both the base and fabric component of each Switch Blade, as shown next.

Step 4. From the OpenArchitect Linux prompt (`[ZX6000-OA3.2.2j]#`), enter the following commands and record the firmware version that is returned (as shown in the following examples):

- For IPMC firmware (applies to base switch component only):

```
[ZX6000-OA3.2.2j]# zreg -n -v VP
```

- For ZMON(/Sparky) firmware (repeat for both base and fabric switch components):

```
[ZX6000-OA3.2.2j]# zreg -n -v VZ
4.45
```

- For OpenArchitect firmware (*repeat for base and fabric component, and note you can only display the active or booted revision, not the alternate version or flash*):

```
[ZX6000-OA3.2.2j]# zreg -n -v V6
3.2.2 build j
```

Step 5. Repeat this procedure for the base and fabric component for both Ethernet Switch Blades in the 14-Slot Shelf.

Step 6. Set these recorded data aside to be used to validate your firmware against the most current release.

Validating and Updating Your Firmware

To validate the versions of firmware, and to determine the most recent release of firmware for your 14-Slot Shelf and its components, complete the following steps:

Step 1. Go to the http://www.hp.com URL.

Step 2. Click on the *Software & Driver Downloads* link.

Step 3. Under the *Support for Your Products* link, go to the *Select a task and enter a product name/number* box and enter *bh5700* in the blank text box. Left click the small double arrow to the right of the text box.

Step 4. In the resulting *Product search results* window, choose the appropriate operating system (if required). The available firmware releases are listed by date.

Step 5. Firmware versions for the components in the 14-Slot Shelf are listed in the *Release Notes* for each firmware release. You must compare your installed version with this information to determine if you have the latest firmware installed on your system. See “Determining Firmware Versions” on page 52 for information on determining the firmware version currently installed on your 14-Slot Shelf.

CAUTION Do not automatically update your 14-Slot Shelf firmware without close analysis of your specific configuration and application. Your 14-Slot Shelf may require that you retain an earlier firmware release for some components or applications. Failure to comply can result in a loss of firmware data.

NOTE Refer to the release notes supplied with each firmware release for detailed firmware update procedures.

Operating Systems Supported by Hewlett-Packard

Specified versions of the Linux Operating System are supported by HP for the HP bh5700 ATCA 14-Slot Blade Server Ethernet Switch Blade. Supported versions include Red Hat and Debian GNU, as follows:

Red Hat RHEL AS, Version 4, Update 3 (HP certified on the HP bh5700 ATCA 14-Slot Blade Server) - Available directly from Red Hat.

For information about additional versions of Red Hat that have been certified on ATCA by HP since publication of this document, see the *HP Advanced Telecom Computing Architecture (HP ATCA) - Support Notes for Installing and Using Red Hat*, available from HP at: http://www.docs.hp.com.

Debian GNU/Linux with HP Telco Extensions (Debian HPTE) - Available from HP on a per-customer basis through HP development and support services.

For information about installing Linux on an HP bh5700 ATCA 14-Slot Blade Server Server Blade, refer to the following HP documentation:

For Red Hat, see the *HP Advanced Telecom Computing Architecture (HP ATCA) - Support Notes for Installing and Using Red Hat*, available from HP at: http://www.docs.hp.com.

For Debian HPTE, see the *Debian GNU/Linux with HP Telco Extensions Version 2.0 on HP Advanced Telecom Computing Architecture (HP ATCA) - Installation Guide*, available from HP upon request.

Default Startup VLAN Topology for the 14-Slot Shelf

The HP bh5700 ATCA 14-Slot Blade Server is configured at the factory so that the Ethernet Switch Blade default Virtual Local Area Network (VLAN) topology incorporates all Switch Blade base ports into one VLAN, and all Switch Blade fabric ports into a separate VLAN. This chapter provides information on the default boot-up configurations for the HP bh5700 ATCA 14-Slot Blade Server Ethernet Switch Blades, the HP bc2100 ATCA Server Blades, and the Shelf Managers (ShMMs).

CAUTION Failure to ensure configuration of the 14-Slot Shelf VLAN topology before connecting the 14-Slot Shelf to a functioning network could cause network failure or loss of data. Ensure that your HP bh5700 ATCA 14-Slot Blade Server is configured with a VLAN topology that is compatible with your existing network before connecting the shelf. Chapter 6, *A Sample VLAN Topology*, provides information on planning and configuring a robust VLAN Topology for your HP bh5700 ATCA 14-Slot Blade Server.

Shelf Manager Startup Configuration

The Shelf Managers (ShMMs) have been configured at the factory as part of the default VLAN topology for your 14-Slot Shelf. They require no further configuration in order to use the default topology. The default IP address on the ShMMs for the *eth 0* port is `10.0.0.52` for the active ShMM, and `10.0.0.53` for the backup. The *eth1* port does not have a default configuration.

Ethernet Switch Blade Startup Configuration

At power on, the Ethernet Switch Blades boots up using two default factory-configured `rc` scripts contained in the `/etc/rcZ.d` directory of the Ethernet Switch Blade to configure each side of the switches. One default `rc` script configures the base ports on each switch while the other configures the fabric ports. The result is a basic VLAN topology for your 14-Slot Shelf that consists of two basic VLANs, each with an assigned IP address: one VLAN for all base ports and another VLAN for all fabric ports for each Ethernet Switch Blade, as shown in Table 6-1.

Table 6-1 Default `rc` Script VLAN Configuration

Section	IP Address	VLAN Ports
Base	10.0.0.42	zre 0 to zre 22 (zre 23 reserved for interswitch link)

Table 6-1 Default `rc` Script VLAN Configuration (Continued)

Section	IP Address	VLAN Ports
Fabric	10.0.1.42	zre 0 to zre 50 (zre 51 reserved for interswitch link)

NOTE A sample alternative Ethernet Switch Blade VLAN configuration is provided in Chapter 6. It allows you to reconfigure your default VLAN topology into a more extensive and nontrivial bootup VLAN topology if desired. Additional examples are also located on the Ethernet Switch Blade at `/etc/rcZ.d/examples`.

HP bc2100 ATCA Server Blade Startup Configuration

The factory default connection of the Server Blade port Gigabit Ethernet (GE) slots are listed in Table 6-2 and defines if they are enabled or disabled at preboot execution environment (PXE). The Server Blade default BIOS configuration (given in Table 6-2) connects the four Server Blade fabric ports to the Ethernet Switch Blades via the 14-Slot Shelf backplane.

Table 6-2 HP bc2100 ATCA Server Blade BIOS Default Port Assignments

HP bc2100 ATCA Server Blade Port	Ethernet Switch Blade Connection
Port 0, GE Slot 100 (enabled at PXE Boot)	Base Interface to Slot 7
Port 1, GE Slot 101 (enabled at PXE Boot)	Base Interface to Slot 8
Port 2, GE Slot 200 (not enabled at PXE Boot)	Fabric Interface to Slot 7, Port 0
Port 3, GE Slot 201 (not enabled at PXE Boot)	Fabric Interface to Slot 8, Port 0
Port 4, GE Slot 300 (not enabled at PXE Boot)	Fabric Interface to Slot 7, Port 1
Port 5, GE Slot 301 (not enabled at PXE Boot)	Fabric Interface to Slot 8, Port 1

NOTE You must reconfigure the default HP bc2100 ATCA Server Blade BIOS in order for the PXE Boot process to enable server ports 2 through 5. Use the procedure described in “The HP bc2100 ATCA Server Blade Firmware” on page 52, steps 1 – 4 to access the BIOS main screen.

Enabling Remote Firmware Update and Diagnostic Support for the HP bc2100 ATCA Server Blade

CAUTION Ensure that the VLAN topology of your HP bh5700 ATCA 14-Slot Blade Server includes access to your remote preboot execution environment (PXE) server before enabling this remote access feature. Failure to comply can result in data loss.

NOTE This procedure requires that you also reference the *HP bh5700 ATCA 14-Slot Blade Server, Maintenance Guide, Diagnostics Procedures* manual for additional instructions, as directed below.

To determine the most recent release of the firmware for your 14-Slot Shelf and its components, complete the following:

Step 1. Ensure that power is applied to the 14-Slot Shelf.

Step 2. Connect your PC or laptop computer to the Server Blade serial port, activate a terminal emulator (9600 baud, 8 data bits, no parity, 1 stop bit) on your PC or laptop computer, and access the Server Blade console screen.

Step 3. With the console screen displayed, cause the Server Blade to reboot. To cause a reboot, you can either cycle power to the 14-Slot Shelf or remove and reinstall (following hot-swap procedures) the respective Server Blade.

Approximately 17 seconds following the start of the boot process, the first Server Blade BIOS message will appear on the console display as the BIOS begins to execute

Step 4. Interrupt the BIOS execution by entering the `delete` character from your PC or laptop computer keyboard to halt the BIOS execution, and display the BIOS main screen.

Step 5. On the BIOS main screen, select the `Advanced Settings->Diagnostic Boot Sequence Configuration` screen.

Step 6. For the remainder of this procedure, refer to the *HP bh5700 ATCA 14-Slot Blade Server, Maintenance Guide, Diagnostics Procedures, Chapter 6, HP bc2100 ATCA Server Blade Functional Specifications, Configuring BIOS Settings for Remote Boot*.

NOTE For information on how to invoke the remote PXE boot sequence used for firmware updates and diagnostic procedures, refer to the *HP bh5700 ATCA 14-Slot Blade Server, Maintenance Guide, Diagnostics Procedures, Using IPMItool to Request Diagnostic Boot*.

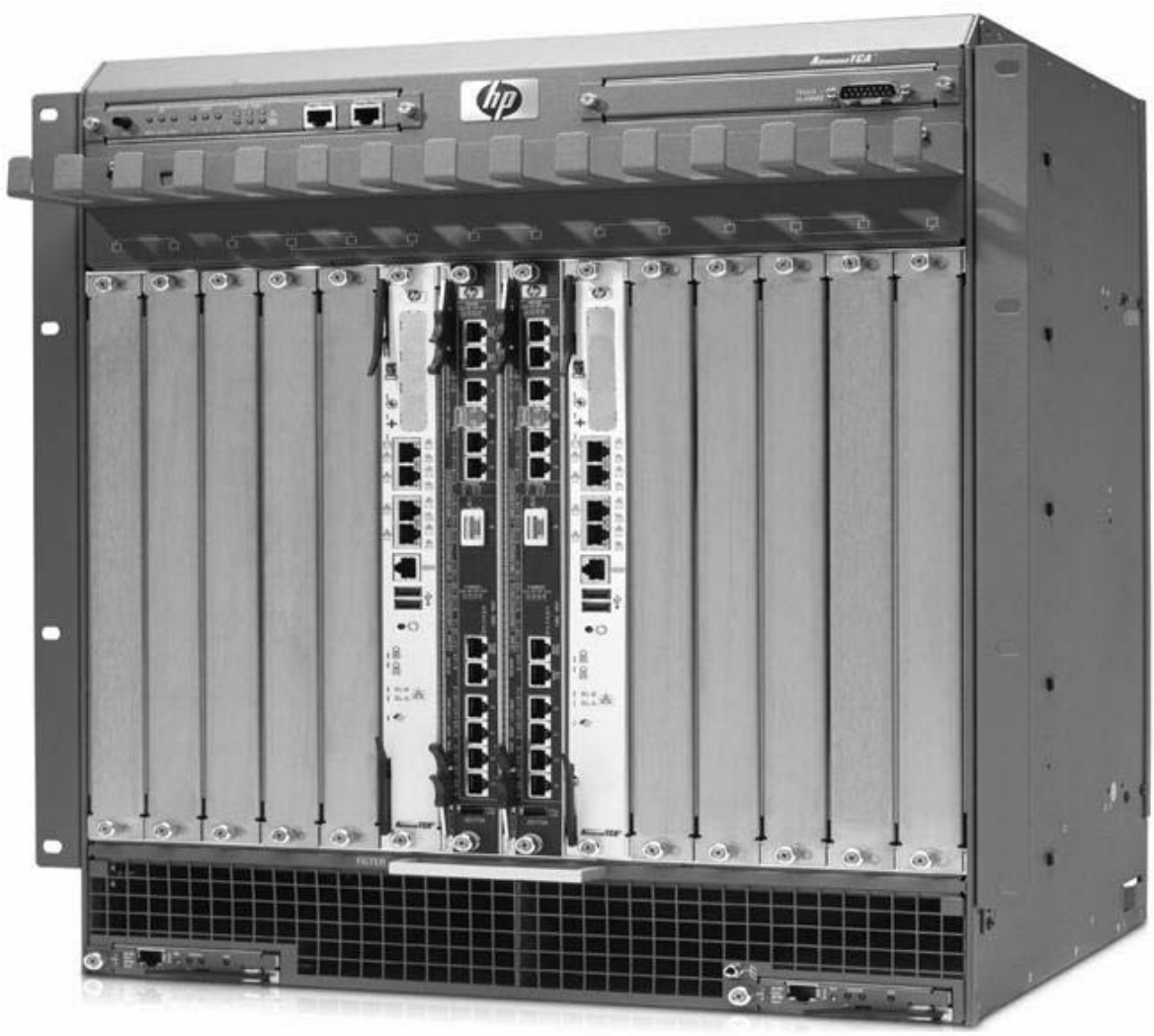
14-Slot Shelf Startup

7 A Sample VLAN Topology

A Sample VLAN Topology

The HP bh5700 ATCA 14-Slot Blade Server (Figure 7-1) is a highly configurable ATCA blade enclosure. The default factory configuration of the 14-Slot Shelf components provides only a limited network interface because the individual components (Shelf Managers, Ethernet Switch Blades, and HP bc2100 ATCA Server Blades) do not come preconfigured as a production network topology.

Figure 7-1 HP bh5700 ATCA 14-Slot Blade Server



CAUTION Failure to ensure proper configuration of the 14-Slot Shelf virtual local area network (VLAN) topology before connecting the 14-Slot Shelf to a functioning network can cause network failure or loss of data. Ensure that your HP bh5700 ATCA 14-Slot Blade Server is configured with a VLAN topology that is compatible with your existing network before connecting the shelf.

IMPORTANT Ensure that you read chapter 5, *14-Slot Shelf Startup,* to gain an understanding of the 14-Slot Shelf factory default VLAN configuration before attempting to configure your 14-Slot Shelf using this chapter.

This chapter provides information on planning and configuring a sample usable VLAN topology for your HP bh5700 ATCA 14-Slot Blade Server before it is connected to your functioning network.

Planning Your Network Topology

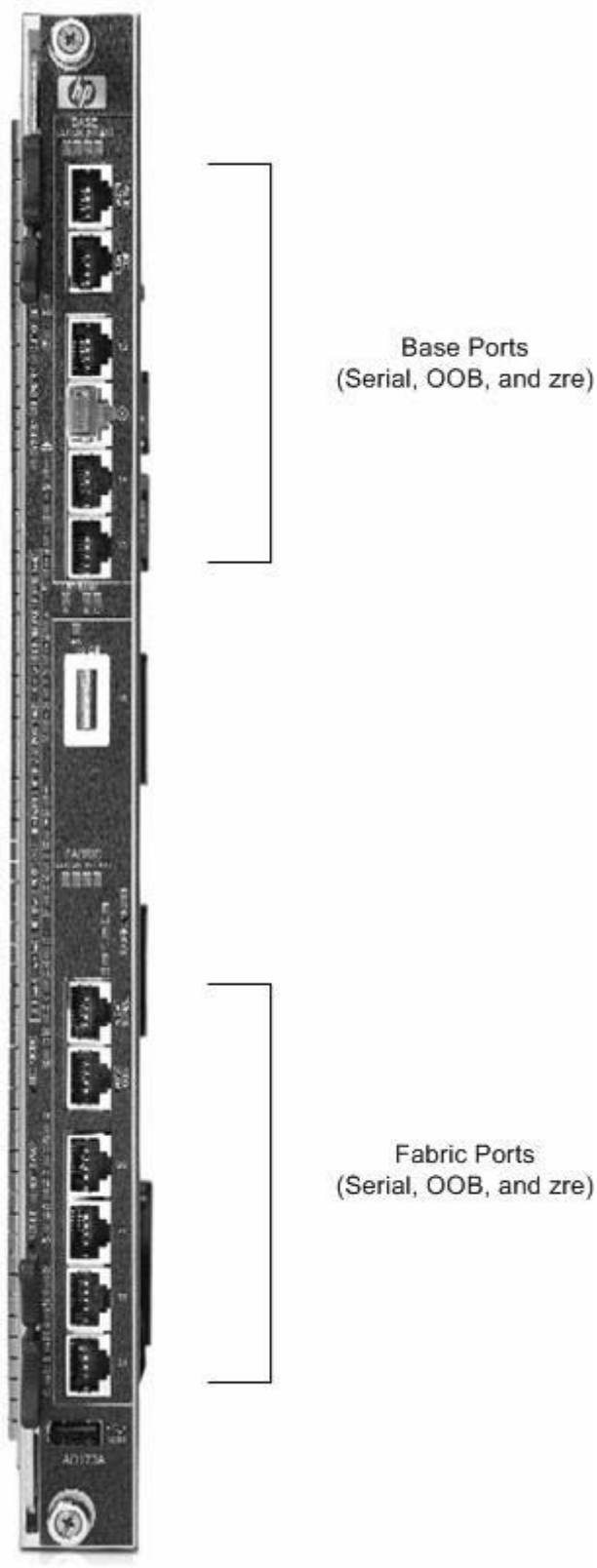
The HP bh5700 ATCA 14-Slot Blade Server is highly configurable, but the default factory configuration is not particularly usable because the individual components (Shelf Managers, Ethernet Switch Blades, and HP bc2100 ATCA Server Blades) do not come preconfigured as a functioning network topology.

Ethernet Switch Blades and the VLANs

The first step in configuring your 14-Slot Shelf is to design a *reasonable* network topology for the ATCA components. The Ethernet Switch Blades are the key to getting the 14-Slot Shelf properly configured and plugged into your enterprise. The Switch Blades are highly configurable, with separate out-of-band (OOB), base, and fabric interfaces. This sample provides a topology that configures these interfaces, but keeps them on separate networks. The rest of this chapter is based on this sample network topology. Your network requirements may differ from what is presented here. The intent of this instructional example is to describe the process of configuring the 14-Slot Shelf, and it may not meet all of the requirements for your particular enterprise.

The Ethernet Switch Blades are central to getting your ATCA 14-Slot Shelf configured. It is helpful to understand the concept of a VLAN. There are 76 network ports, or NIC interfaces, on the Ethernet Switch Blades that need to be configured (see Figure 7-2 on page 62). Some of these ports are out-of-band (OOB), some are base, and some are fabric. Some of the ports connect to other blades, some to the ShMMs, some to the other Switch Blade, and some to the front panel of the switch.

Figure 7-2 Ethernet Switch Blade Front Panel



In the simplest terms, a VLAN is a user-defined set of these ports, grouped together such that they live in the same subnet. A VLAN can be given an IP address that serves as an endpoint (or destination) for outside traffic, or it may live anonymously within the Switch Blade and rely on established switch routing to send or receive traffic on an *anonymous* VLAN.

Network Interfaces Partitions

The best way to think about partitioning the network interfaces is by modeling the intended use-cases. The objective is to let the use-cases define the topology, and to let the topology define the VLANs you need to create in your Ethernet Switch Blades. For this sample topology, there are three main use-cases:

- **Walk-up Configuration LAN:** The Switch Blade OOB ports should be set up for walk-up configuration purposes only; that is, to allow you to plug a laptop computer into the Switch Blade in order to gain access to the Switch Blade configuration commands. The intent is that the OOB ports are protected by the physical security imposed on the 14-Slot Shelf unit.

IMPORTANT These OOB LAN ports on the Switch Blades should never be plugged into an enterprise network.

- **Management LAN:** One base interface (the raw Ethernet connection zre12 that is exposed on the front panel of the Switch Blade) is configured to support all the functions required for managing the 14-Slot Shelf remotely. Management protocols such as SNMP, IPMI, and PXE send their traffic on the management LAN. The management LAN is intended to be connected to the designated management network within the enterprise. The remaining base interfaces (zre0 to 11, zre14 to 21) are configured into a single VLAN in order to provide control-plane connectivity to all blades in the 14-Slot Shelf.
- **Payload LAN:** The fabric interfaces (zre0 to 51 fabric) are configured for bearer or payload traffic - that is, application traffic requiring intra- and inter-shelf networking.

Other use-cases center on the switch-to-switch traffic (between Ethernet Switch Blades), and on the traffic from the Ethernet Switch Blades to the Shelf Managers (ShMMs). Each use-case defines another part of this sample network topology:

- **Switch-to-Switch LAN:** Creates a private network that enables the two Switch Blades to talk to each another. This link is called the Inter-Switch Link (ISL), and accomplishes three goals:
  - — Traffic hitting one Switch Blade can see the network devices connected to the other Switch Blade.
  - — Each Switch Blade can see the active ShMM at all times.
  - — This LAN is also needed for High Availablility (HA) operation.

NOTE This VLAN contains raw Ethernet connections *zre22* and *zre23*; *zre22* connects the Switch Blade to the same-side ShMM, and *zre23* is the Inter-Switch link (ISL) between the two Switch Blades.

- **ShMM Cross-connect LAN:**

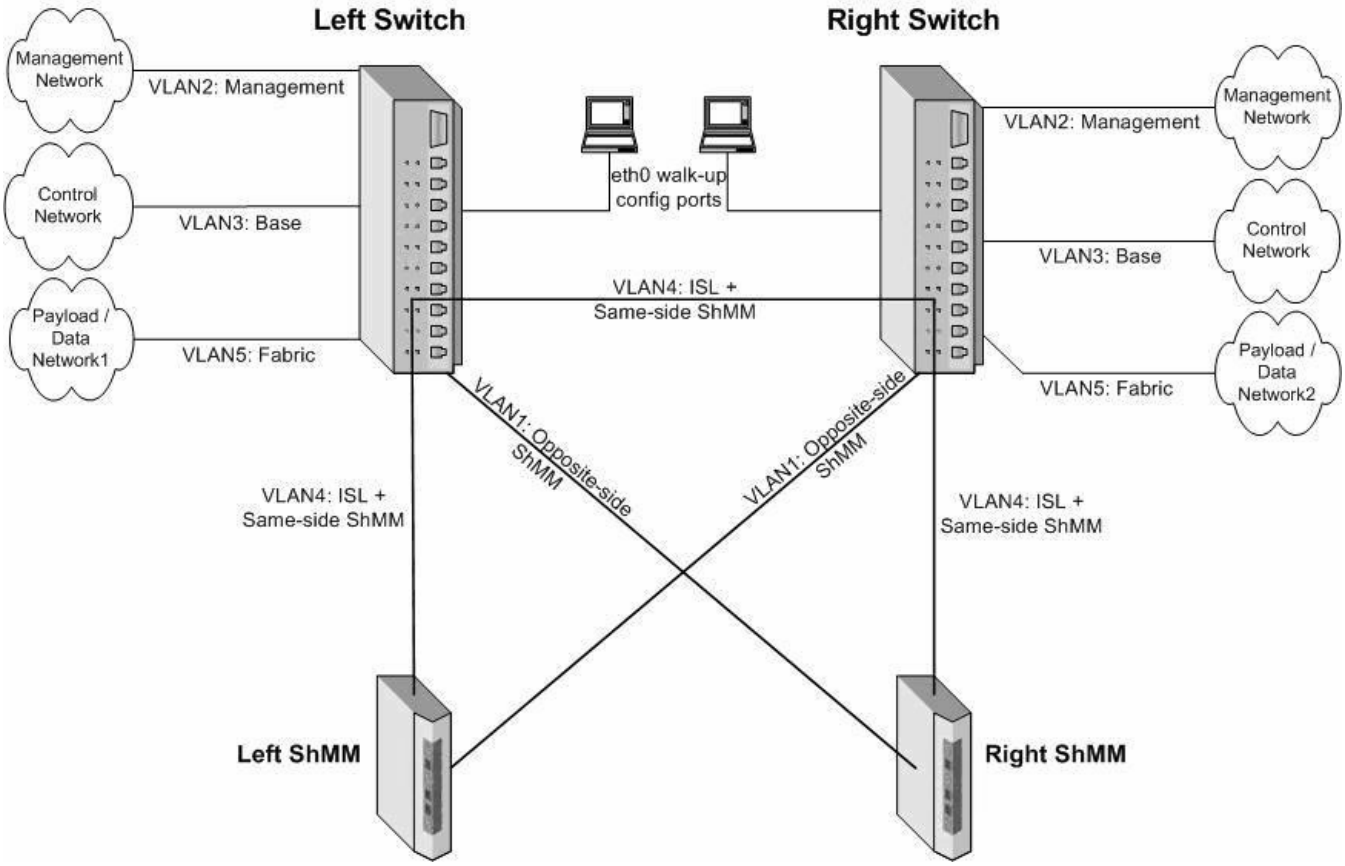
  Creates a private network on each Ethernet Switch Blade connecting to the opposite-side ShMM by configuring the eth1 interface of each ShMM. The zre13 port allows you to talk from the Switch Blade to the opposite-side ShMM. This subnet, in combination with the switch-to-switch LAN above, guarantees that each Switch Blade can always talk directly to the active ShMM - even if one of the Ethernet Switch Blades were to fail, and the active ShMM is on the opposite-side of the surviving Switch Blade.

This topology also allows you to hide some functionality of the ShMM behind the Switch Blades. This means that blades within the 14-Slot Shelf and devices outside of the 14-Slot Shelf are not allowed to connect directly to the ShMMs. All ShMM management traffic (SNMP / IPMI) is routed through the Switch Blades via one of these private LANs, and onto the externally-exposed management LAN. Not connecting directly to the ShMM enhances the overall security of the 14-Slot Shelf.

IMPORTANT The ShMM command set is powerful enough to bring down or reboot the entire shelf. By exposing only the management traffic you want through the Switch Blades, you allow the ShMM to do its job without opening a major security hole for the complete 14-Slot Shelf.

In this sample, you will create five separate VLANs on the Ethernet Switch Blades to build your network topology. You will have a topology that looks like Figure 7-3, and includes the following VLANs:

Figure 7-3 Simplified Block Diagram of the Sample VLAN Topology



- vlan1: Cross-connects each Ethernet Switch Blade to the opposite-side ShMM.
- vlan2: Creates a Management LAN for the entire 14-Slot Shelf.
- vlan3: Combines the remaining base interfaces (control plane) into a single VLAN.
- vlan4: Creates a switch-to-switch LAN, and includes the same-side ShMM.

- vlan5: Combines the fabric interfaces (bearer plane) into a single VLAN.

The only connections to the outside enterprise are through VLAN2 (base management LAN), VLAN3 (base control LAN), and VLAN5 (fabric payload LAN).

The management network takes up one base interface (zre12). The control network consumes the remaining base interfaces (zre0 to 11, zre14 to 21) and the payload network consumes all fabric interfaces (zre0 to 51 fabric). The only network connecting outside of the 14-Slot Shelf that actually requires an assigned IP address is the management network. The control and payload networks, while needing physical connectivity to the outside, do not require assigned IP addresses because these VLANs just act as a switch, switching traffic to and from the endpoints on these networks.

Building the Sample Topology in the 14-Slot Shelf

To build this network topology of five VLANs in the 14-Slot Shelf, you will start with the ShMM (because it requires the lesser amount of configuration) and then move on to the Ethernet Switch Blade.

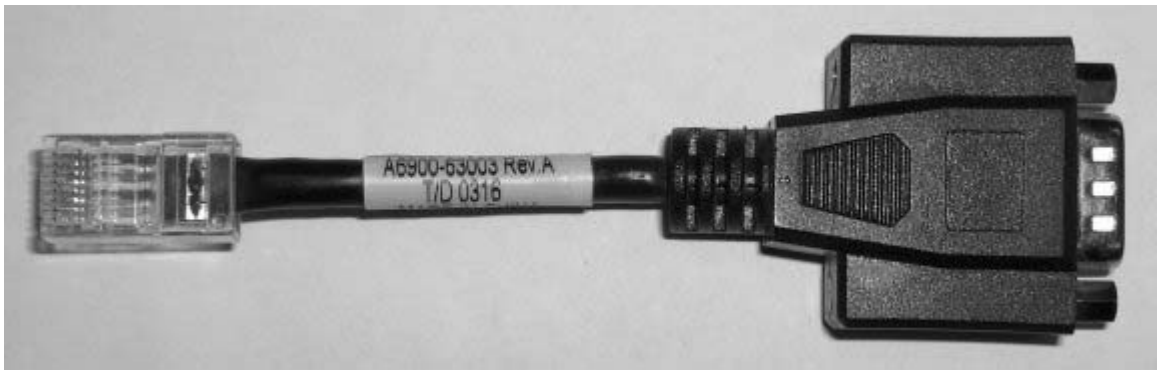
Shelf Manager Usage and Configuration

In order to configure a Shelf Manager (ShMM), you must first connect your terminal or laptop computer to the respective ShMM serial port. The two ShMM serial ports (one RJ-45 connector for each ShMM) are mounted on the Alarm Display Panel (Figure 7-4), which is located on the upper-left front of the 14-Slot Shelf. Serial access (RS-232) is set to 8 data bits, 1 stop bit, no parity, and 9600 baud.

Figure 7-4 Identifying 2 RJ-45 Shelf Manager Serial Connectors on the Alarm Display Panel

IMPORTANT You must use an RJ-45/DB-9 Adapter Cable (Part Number A6800-63006, see Figure 7-5 on page 66) supplied with your HP bh5700 ATCA 14-Slot Blade Server in combination with a Modem Eliminator Cable that has a DB-9 *female* connector on each end) in order to connect your terminal or laptop computer to a ShMM serial port on the 14-Slot Shelf.

Figure 7-5 RJ-45/DB-9 Console Adapter Cable



Shelf Manager Command Line Interface and Basic Commands

After connecting your terminal or laptop to a ShMM, login to the ShMM as root. The ShMM command line interface prompt (clia) will appear on your terminal or laptop display. Use the ShMM command line interface to enter the following basic ShMM commands and see how they work:

`clia help` This command gives you a list of all ShMM commands.

`clia shmstatus` This command tells you if this ShMM is the active ShMM, or the backup.

`clia board -v` This command tells information about the blade population in the shelf.

`clia switchover` This command causes the backup ShMM to become active, and forces the active ShMM to reboot, and then go into backup mode.

`clia boardreset 1` This command causes the blade in physical slot 1 to reboot. If there is no blade in slot 1, the command has no effect.

If you want to learn more about specific ShMM commands, refer to the *HP bh5700 ATCA 14-Slot Blade Server, Shelf Manager User and Service Guide* and the *Shelf Manager External Interface User and Service Guide*.

Configuring eth0

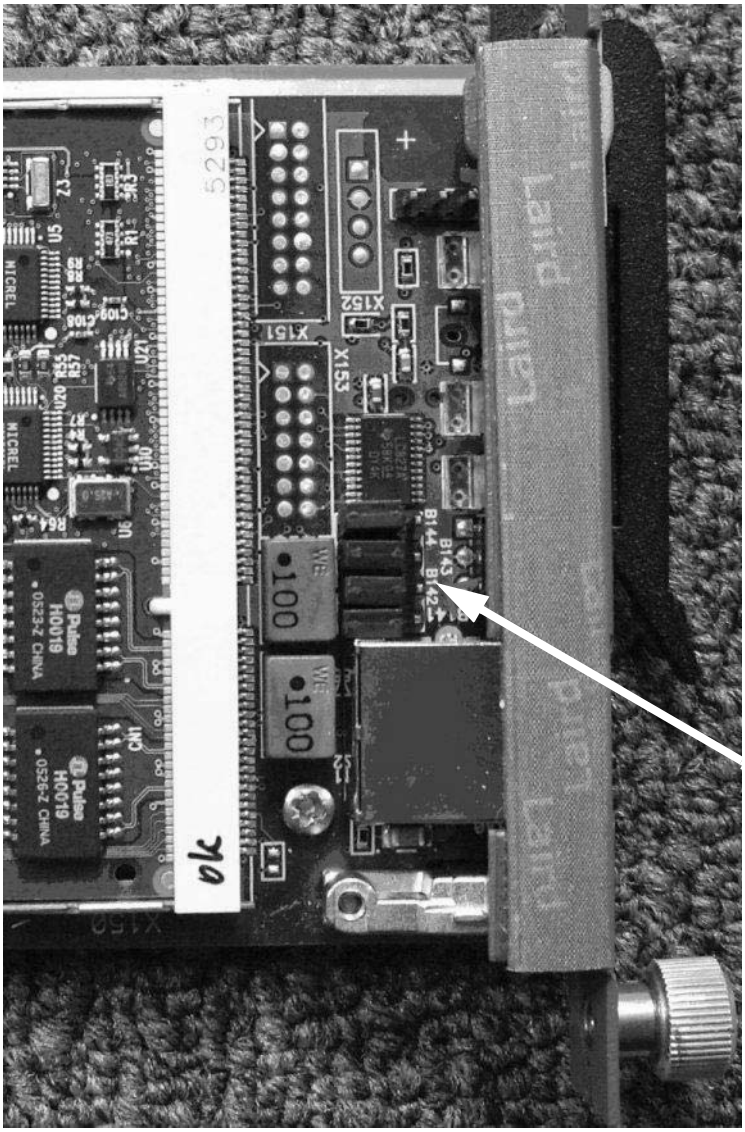
In order to configure *eth0* (the RMCP network adapter default IP address) on the ShMM, you must first ensure that jumpers B141 to 144 on both ShMM carrier boards are installed in the *back* position (see Figure 7-6 on page 67). This ensures that *eth0* is ported to the 14-Slot Shelf backplane, and not to the ShMM front panel. Complete the following steps to ensure these jumpers are installed as required:

Step 1. Remove the ShMM you are about to configure from the 14-Slot Shelf. See the *HP bh5700 ATCA 14-Slot Blade Server, Maintenance Guide, Removal and Replacement Procedures* document for instructions on removing and reinstalling the ShMM.

CAUTION Observe all ESD safety precautions while completing this procedure. Failure to follow ESD safety precautions could result in damage to the 14-Slot Shelf and equipment.

Step 2. With the ShMM removed, ensure that jumpers B141 to B144 on the ShMM carrier board are installed in the *back* position (toward the rear of the carrier board), as shown in Figure 7-6 on page 67.

Figure 7-6Identifying Jumpers B141 to B144 Installed on ShMM Carrier Board



Step 3. Reinstall the ShMM Carrier Board in the 14-Slot Shelf.

The default IP address for *eth0* for the ShMM is either `10.0.0.52` (active ShMM) or `10.0.0.53` (backup ShMM). Since you are hiding the ShMMs on their own private network such that they are only known to the Switch Blade, you will move *eth0* to the `192.168.0.x` network.

To move eth0 to the `192.168.0.x` network, complete the following steps:

Step 1. Enter the following ShMM commands on the active ShMM:

```
clia setlanconfig 1 3 192.168.0.2
```

This command sets the IP address of the active and backup ShMMs for *eth0*.

```
clia setlanconfig 1 6 255.255.255.0
```

This command sets the netmask of the active and backup ShMMs for *eth0*.

```
clia setlanconfig 1 12 192.168.0.43
```

This command sets the gateway address of the active and backup ShMMs for *eth0*.

NOTE In the sample network topology, the default gateway of the ShMM must be set to the IP address of one of the Ethernet Switch Blades in the `vlan4` subnet. Configuration of `vlan4` is covered in the Ethernet Switch Blade configuration section found later in this document.

Step 2. To check your work, enter the following ShMM command:

```
clia fruinfo -v 20 1 | more
```

This command displays the contents of the persistent ShMM settings as held in the chassis non-volatile FRU (field replaceable unit) memory. You will see the LAN configuration, as you have entered it in the previous commands.

NOTE Another way to check your work is to issue the following UNIX command:

```
ifconfig eth0
```

- On the active ShMM, the IP address should be reported as: `192.168.0.2`
- On the backup ShMM, the IP address should be reported as: `192.168.0.3`

Configuring eth1

Now that *eth0* is configured, you need to set up *eth1*. Note that *eth1* is not configured in the default ShMM configuration, and must be set up so that each switch can talk directly to its opposite side ShMM. This is done by adding one `ifconfig` command in the `rc` startup file `/etc/rc.acb4`.

Step 1. Add the following text to the `/etc/rc.acb4` file prior to *Step 4*, highlighted as shown:

```
# Configure ShMM eth1 interface for cross-connecting to
# the opposite-side switch.
#
ifconfig eth1 192.168.2.2 netmask 255.255.255.0 up
########
# Step 4: Start up daemons
########
.
.
.
```

IMPORTANT Ensure this configuration change is added to each ShMM.

NOTE The IP address for *eth1* is the same on both ShMMs. Each ShMM resides in a private network that is created by the opposite side Ethernet Switch Blade.

Step 2. In the `/etc/shelfman.conf` file of both ShMMs, change the value of the following variables as shown:

`SWITCH_OVER_TIMEOUT_ON_BROKEN_LINK` needs to be set to a value of 120 or above. This numeric value is the number of seconds that will lapse between when eth0 on the ShMM is detected as down and when the active ShMM performs a failover to the backup ShMM. The value should be at least longer that it takes to reboot an Ethernet Switch Blade, otherwise rebooting a Switch Blade can cause the ShMMs to failover. Enter your value as follows: `SWITCHOVER_TIMEOUT_ON_BROKEN_LINK = 120`

`RMCP_NET_ADAPTER2` needs to be set to a non-interface name, since you are controlling both network interfaces of the ShMM directly. By default, `RMCP_NET_ADAPTER2` is set to eth1, which, under certain ShMM failure modes, causes the IP address of eth0 to be re-instantiated on `eth1`. In order to prevent this behavior, which is incompatible with your sample network topology, change the value to: `RMCP_NET_ADAPTER2 = "noeth"`

Step 3. After making the above configuration changes, reboot both ShMMs.

IMPORTANT These configuration changes will have to be repeated when any of the following occur:

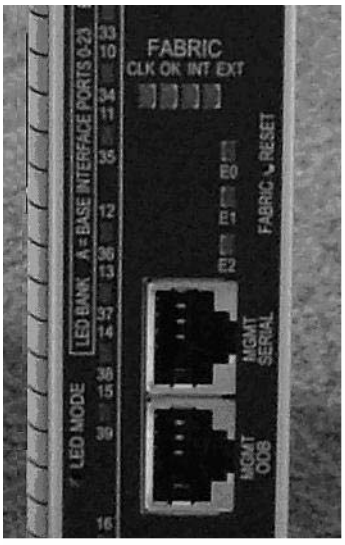
- A ShMM is replaced
- The ShMM firmware is updated
- The ShMM is reset to factory default settings

Configuring the Ethernet Switch Blade

To configure the base and fabric switch functions of an Ethernet Switch Blade, connect your terminal or laptop computer to the base and fabric serial ports (one port at a time) of a Switch Blade. The Ethernet Switch Blade serial ports (RJ-45 connectors) are mounted on the Ethernet Switch Blade front panel, as shown in Figure 7-7 and Figure 7-8 on page 70.

Figure 7-7 Ethernet Switch Blade Front Panel Base Serial Ports

Figure 7-8 Ethernet Switch Blade Front Panel Fabric Serial Ports



IMPORTANT You must use an RJ-45/DB-9 Adapter Cable (supplied with your HP bh5700 ATCA 14-Slot Blade Server) in combination with a modem eliminator cable (with a DB-9 *female* connector on each end) in order to connect your terminal or laptop computer to a serial port on the 14-Slot Shelf.

Serial access (RS-232) is set to 8 data bits, 1 stop bit, no parity, and 9600 baud. After connecting your terminal or laptop to the base serial port, login as root.

Viewing the Default (or Current) Ethernet Switch Blade Configuration

To view the default (or current) Switch Blade base and fabric configuration, complete the following:

- Ensure that your terminal or laptop computer is connected to either the base or fabric serial interface RJ-45 connector, as desired. See Figure 7-7 on page 70 and Figure 7-8 on page 70.
- Issue the following commands:

  `zconfig -a`

  This command shows the base or fabric interfaces that are currently configured into VLANs.

  `ifconfig`

  This command shows the network assignments for the defined base or fabric VLANs and OOB port.

Saving Your Changes When Rebooting the Switch Blade

The Ethernet Switch Blade always boots from a standard read-only OS image (OpenArchitect version 3.2.2). Any changes you make are loaded from flash memory after the read-only OS image is booted. In order to make user-level changes persistent, you must execute a `zsync` command prior to rebooting the Switch Blade.

NOTE It is a good idea to make corresponding changes to both of the Ethernet Switch Blades at the same time in order to keep your network topology consistent across the 14-Slot Shelf.

To save user-level changes and reboot the Switch Blade, issue the following commands:

```
zsync
reboot
```

Another option when rebooting the Switch Blade is to load the read-only OS, but not load any user-level changes at boot time. To do this, issue the following command:

```
reboot -i
```

After performing a `reboot -i`, if you want to erase all user-level persistent changes, execute a `zsync` command after the OS has rebooted from the `reboot -i` command.

Configuring SNMP

The Switch Blade automatically starts the `snmpd` daemon when it boots. However, you must make a change to the `snmpd.conf` file on the Switch Blade, and you should also install a copy of the ShMM SNMP MIB onto your system manager (that is, into the system where HP OpenView and other management applications that manage the shelf are running).

On the Switch Blade, open the file `/usr/share/snmp/snmpd.conf`, and add the following SNMP proxy directive, shown highlighted here:

```
#
# net-snmp (or ucd-snmp) persistent data file.
#
syslocation unknown
syscontact unknown
sysservices 72
rocommunity public
rwcommunity private


#
# Proxy all requests intended for destination 16394 to the ShMM.
#
proxy -v1 -cpublic 192.168.0.2 enterprises.16394

#
# SMUX peer support (gated)
#
smuxpeer .1.3.6.1.4.1.4.3.1.4 secret

.

.

.
```

To save this change on the Switch Blade, enter the command:

`zsync`

In order to allow your system manager to translate SNMP queries (for example, `snmpwalk`) made against the ShMM, you must place a copy of the ShMM's MIB onto your system manager. The MIB is used by the system manager to translate numerical information about the status and variables contained on the ShMMs.

The ShMM SNMP MIB is avaialable for download at this web site:

http://www.a-tca.com/dev_atca_new/download.asp?source=&file=pps.zip

Unzip the downloaded file, and then rename the MIB file to: `PPS-SENTRY-MIB.txt`. Copy this file to the location on your system manager where your MIBs are kept. Optionally, you may put a copy of the ShMM MIB onto your Switch Blade as: `/usr/share/snmp/mibs/PPS-SENTRY-MIB.txt`.

NOTE The MIBs for the Switch Blades are kept under the directory: `/usr/share/snmp/mibs`. You may also want to consider copying some of these Switch Blade MIBs to the designated system manager.

Configuring eth0 Out-of-Band Port (The *Walk-up* Configuration Port)

The Out-of-Band Ethernet port is located below the serial access port on the Ethernet Switch Blade front panel, and is labeled as OOB. See Figure 7-7 on page 70 and Figure 7-8 on page 70.

This is the OOB *eth0* port on the Switch Blade, and you want to use it as a *walk-up* configuration port. You (or an administrator) are able to walk up to the ATCA 14-Slot Shelf with a laptop computer, plug into this port, get an assigned IP address, and then use telnet to the Switch Blade to perform normal Switch Blade configuration tasks. Using the `dhcpd` daemon provided on the Switch Blade, you can set up *eth0* to be the configuration port.

The *eth0* configuration must be persistent, so that the *eth0* port will be configured properly at boot time. To do this, complete the following steps to create a `dhcpd` config file and an `rc` script that are used at boot time:

Step 1. Use the serial access port to log into the Switch Blade, then add the following `dhcpd.eth0.conf` configuration file to the `/etc` directory:

```
# /etc/dhcpd.eth0.conf
#
# Hardwired to eth0 for dhcpd config at startup.

option domain-name "dhcpdefault.net";
option subnet-mask 255.255.255.0;
default-lease-time 2400;
max-lease-time 7200;

subnet 192.168.1.0 netmask 255.255.255.0 {
  range 192.168.1.2 192.168.1.20;
  option broadcast-address 192.168.1.255;
 }
```

Step 2. Add the following `S00dhcpd.eth0 rc` script to the `/etc/rcZ.d` directory:

```
#!/bin/sh

# /etc/rcZ.d/S00dhcpd.eth0
#
# RC script to start/stop the dhcpd daemon on the eth0
# interface. This allows eth0 to be used as a walk-up
# config port.
#

#
# Create a variable that is the location of the process ID
# for the dhcpd daemon.
#
DHCPPID=/var/run/dhcpd.eth0

#
# Use the saved process ID as a handle to kill the daemon.
#
if [ "$1" = stop ]; then
        [ -f "$DHCPPID" ] && kill `cat $DHCPPID`
        rm -f $DHCPPID
        ifconfig eth0 down
        exit 0
fi
```

```
#
# If you get to here, and you are not starting the daemon,
# display usage info, and exit.
#
[ "$1" != start ] && echo "usage: `basename $0` start | stop" && exit 0

#########################################################################
#
# Bring up the OOB port and dedicated DHCP server.
# Save the daemon process ID for killing the process later.

ifconfig eth0 192.168.1.1 netmask $NETMASK up

dhcpd -cf /etc/dhcpd.eth0.conf -pf $DHCPPID eth0#
```

Step 3. Issue the following command to make your changes persistent:

```
zsync
```

Step 4. Enter the following commands to start up the Switch Blade dhcpd daemon:

```
chmod 755 /etc/rcZ.d/S00dhcpd.eth0

/etc/rcZ.d/S00dhcpd.eth0 start
```

Step 5. Issue the following commands to verify that the dhcpd daemon is running:

```
ps -efw | grep dhcpd
```

The Switch Blade should return the following message:

```
root 163 1 0 Mar03 ? 00:00:11 dhcpd -cf /etc/dhcpd.eth0.conf -pf

/var/run/dhcpd.eth0 eth0
```

Step 6. Now that the daemon is running, try connecting an Ethernet cable from a laptop computer to the OOB (*eth0*) port on the Switch Blade front panel. See Figure 7-7 on page 70 and Figure 7-8 on page 70.

Step 7. Open a telnet session on your Linux laptop, and enter the command:

```
ifup eth0
```

Step 8. Enter the ifconfig command on your laptop to verify that the laptop's *eth0* received an IP address from the Switch Blade, as follows:

```
ifconfig eth0

eth0      Link encap:Ethernet  HWaddr 00:11:65:09:EF:FC
          inet addr:192.168.1.2  Bcast:192.168.1.255 Mask:255.255.255.0
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:100
          RX bytes:0 (0.0 b)  TX bytes:0 (0.0 b)

           Base address:0x8400
```

Step 9. Now that the laptop has an IP address, telnet to the Switch Blade to make all further configuration changes by entering the following:

```
telnet 192.168.1.1
```

The Out-of-band port is now configured as your walk-up configuration port.

IMPORTANT Make the same set of changes to the redundant, failover Ethernet Switch Blade at this time in order to maintain High Availability integrity for the 14-Slot Shelf.

Configuring the Opposite-Side Shelf Manager (zre13 base)

You are now ready to start configuring the base interfaces on the Ethernet Switch Blade. The first one that you want to configure is `vlan1`, which is the network that connects your Switch Blade to the opposite side ShMM. To configure the opposite side ShMM, complete the following steps:

Step 1. Tear down all base interfaces by issuing the following command:

```
zconfig -t
```

Step 2. To build *vlan1*, and to make sure it is recreated when you reboot the Switch Blade, add the following `S21cross-shmm rc` script to the `/etc/rcZ.d` directory:

```
#!/bin/sh

#
# /etc/rcZ.d/S21cross-shmm
#
# rc script to build vlan1 that connects the Switch Blade
# to the opposite-side ShMM.
#

set -u

case "$1" in
    start)

                                                                    #
    Build vlan1 that connects the Switch Blade to the
      # cross-connected ShMM.
      #
      zconfig zhp0: vlan1=zre13       # ShMM eth1 cross-connect
      zconfig zre13=untag1

      # Assign an IP address to zhp0/vlan1:
      # The "other side" ShMM eth1 is always 192.168.2.2.
      #
      ifconfig zhp0 192.168.2.1 netmask 255.255.255.0 up

      ;;

    stop)
```

```
        # Tear down vlan1 that connects the Switch Blade to the
        # cross-connected ShMM.
        #
        ifconfig zhp0 down
        zconfig zhp0:teardown

        ;;
    *)
        echo "Usage: $0 { start | stop }"
        exit 1
esac

exit 0
```

Step 3. Issue the `zsync` command to make the `rc` script persistent:

```
zsync
```

Step 4. Enter the following commands in order to start up `zhp0/vlan1`:

```
chmod 755 /etc/rcZ.d/S21cross-shmm

/etc/rcZ.d/S21cross-shmm start
```

Step 5. Determine if `zhp0/vlan1` is properly configured by using the following commands:

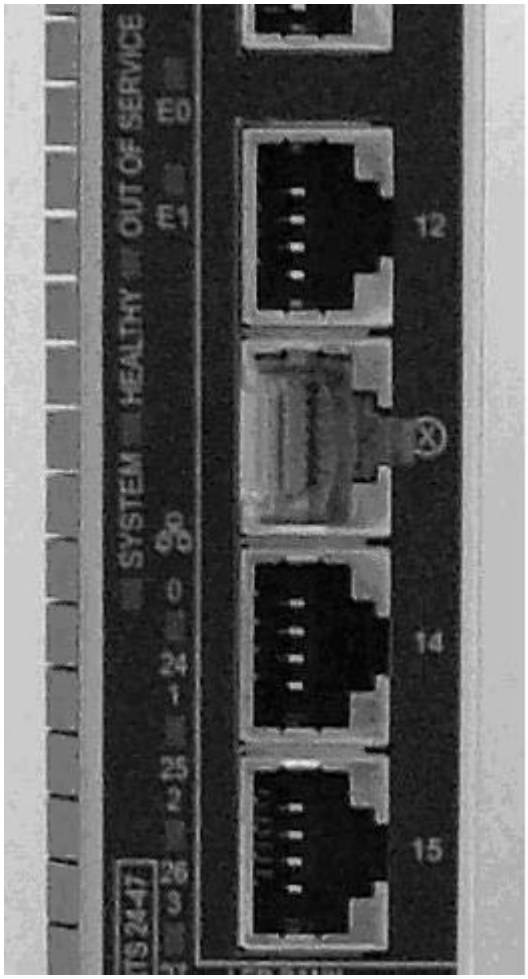
```
zconfig -a

zhp0: vlan1 = zre13
zre13 = untag1

ifconfig zhp0

zhp0      Link encap:Ethernet  HWaddr 00:11:65:09:EC:18
          inet addr:192.168.2.1  Bcast:192.168.2.255 Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:204 errors:0 dropped:0 overruns:0 frame:0
          TX packets:302 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:100
          RX bytes:15327 (14.9 Kb)  TX bytes:20677 (20.1 Kb)

          Base address:0xc000
```

NOTE Make the same set of changes to the redundant, failover Ethernet Switch Blade at this time in order to maintain High Availability integrity for the 14-Slot Shelf.

Configuring the Management LAN (zre12 base)

You are now ready to configure the management LAN, which is denoted as *vlan2* in your sample network topology. This VLAN (*vlan2*) consists of a single base interface (zre12). Note that the zre12 port is accessible at an RJ-45 connector on the Ethernet Switch Blade front panel, as shown in Figure 7-9.

Figure 7-9 The zre12 Base Interface, Ethernet Switch Blade Front Panel



To build the Management LAN, complete the following steps:

Step 1. To build *vlan2* and ensure that it is recreated when you reboot the Switch Blade, you must add an `rc` script. Add the following `S22mgmt rc` script to the `/etc/rcZ.d` directory:

NOTE In the following script, you will want to provide an IP address for `zhp1/vlan2` that is compatible with your management network. The IP address shown in the following script is just an example.

```
#!/bin/sh

#
# /etc/rcZ.d/S22mgmt
#
# rc script to build the management VLAN for
# the ATCA shelf.
#
```

```
set -u

case "$1" in
    start)

      # Build vlan2 that contains zre12 as the only
      # configured port.
      #
      zconfig zhp1: vlan2=zre12    # zre12 egress is front-panel
      zconfig zre12=untag2

      # Assign an IP address to zhp1/vlan2:
      #
      ifconfig zhp1 10.35.50.41 netmask 255.0.0.0 up

      ;;

    stop)

      # Tear down vlan2 that contains zre12.
      #
      ifconfig zhp1 down
      zconfig zhp1:teardown

      ;;
   *)
      echo "Usage: $0 { start | stop }"
      exit 1
esac
exit 0
```

Step 2. Enter the `zsync` command to make the `rc` script persistent:

```
zsync
```

Step 3. Enter the following commands in order to start up `zhp1/vlan2`:

```
chmod 755 /etc/rcZ.d/S22mgmt
```

```
/etc/rcZ.d/S22mgmt start
```

Step 4. Use the following commands to verify that `zhp1/vlan2` is properly configured:

```
zconfig -a

zhp0: vlan1 = zre13
zhp1: vlan2 = zre12
zre13 = untag1
zre12 = untag2

ifconfig zhp1

zhp1      Link encap:Ethernet  HWaddr 00:11:65:09:EC:19
```

```
inet addr:10.35.50.41  Bcast:10.255.255.255  Mask:255.0.0.0
UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
RX packets:1443377 errors:0 dropped:0 overruns:0 frame:0
TX packets:42 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:100
RX bytes:123946159 (118.2 Mb)  TX bytes:1982 (1.9 Kb)

 Base address:0xc000
```

Two VLANs have now been defined; one for the cross-connect to the opposite-side ShMM, and another for the management LAN.

NOTE To enable *vlan2* to pass traffic to your management network, you must run a network cable from the front panel of the Switch Blade (RJ-45 connector labeled *12*) to a network connector in your management network.

NOTE Make the same set of changes to the redundant, failover Ethernet Switch Blade at this time in order to maintain High Availability integrity for the 14-Slot Shelf.

Configuring the Control LAN and Remaining Base Interfaces

You are now ready to configure the remaining Ethernet Switch Blade base interfaces, which will become *vlan3*. Note that *vlan3* includes *zre0* to *zre11*, and *zre14* to *zre21* on the Ethernet Switch Blade front panel. The function of *vlan3* is to serve as the Control LAN.

You do not need to assign an IP address to this VLAN, because the intent is that this VLAN merely passes traffic through to endpoints defined elsewhere in the14-Slot Shelf. Any control plane traffic to the 14-Slot Shelf will come in via *vlan3*, which (acting as a switch) will send the traffic to the appropriate blade in the 14-Slot Shelf.

IMPORTANT When configuring the base interfaces on the HP bc2100 ATCA Server Blades in this topology, the Server Blade IP address must reside within the control network space to properly connect to the 14-Slot Shelf and to the outside enterprise.

To build *vlan3*, complete the following steps:

Step 1. Add the following `S23base rc` script to the `/etc/rcZ.d` directory to ensure that *vlan3* is recreated when you reboot the Ethernet Switch Blade:

```
#!/bin/sh

#
# /etc/rcZ.d/S23base
#
# rc script to build the base interface VLAN for
# the ATCA shelf.
#

set -u
```

```
case "$1" in
    start)

      # Build vlan3 that contains zre0..11,zrezre14..21.
      #
      zconfig zhp2: vlan3=zre0..11,zre14..21
      zconfig zre0..11,zre14..21=untag3

      # Do not assign an IP address to this zhp2/vlan3.
      # Just set the state of zhp2/vlan3 to up.
      #
      ifconfig zhp2 up

      ;;

    stop)

      # Tear down vlan3 that contains zre0..11,zre14..21.
      #
      ifconfig zhp2 down
      zconfig zhp2:teardown

      ;;
   *)
      echo "Usage: $0 { start | stop }"
      exit 1
esac

exit 0
```

Step 2. Enter the following command line to move the default script out of the way. This will ensure that the default script does not execute on the Switch Blade that configures the base interfaces:

```
mv /etc/rcZ.d/S50layer2 /etc/rcZ.d/off.S50layer2
```

Step 3. Enter the `zsync` command to make the `rc` script persistent:

```
zsync
```

Step 4. Enter the following commands to start up `zhp2/vlan3`:

```
chmod 755 /etc/rcZ.d/S23base

/etc/rcZ.d/S23base start
```

Step 5. Use the following commands to ensure that `zhp2/vlan3` is properly configured:

```
zconfig -a


zhp0: vlan1 = zre13
zhp1: vlan2 = zre12

zhp2: vlan3 = zre0..11, zre14..21
```

```
zre13 = untag1
zre12 = untag2
zre0..11, zre14..21 = untag3

ifconfig zhp2

zhp2      Link encap:Ethernet  HWaddr 00:11:65:09:EC:1A
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:3582 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:100
          RX bytes:549764 (536.8 Kb)  TX bytes:0 (0.0 b)
           Base address:0xc000
```

Three of the VLANs in the sample topology have now been defined; one for the cross connect to the opposite side ShMM, a second for the management LAN external connection, and a third for the remaining base interfaces in the 14-Slot Shelf.

IMPORTANT Enable *vlan3* to pass traffic to the control network. You must run a network cable from the front panel of the Switch Blade (choose one of the RJ-45 connectors labeled *14* or *15*) to a network connector in your control network.

NOTE Make the same set of changes to the redundant, failover Ethernet Switch Blade at this time in order to maintain High Availability integrity for the 14-Slot Shelf.

Configuring the Inter-Switch Link and Same Side Shelf Manager (zre22 to 23 base)

You are now ready to configure *vlan4* of our sample topology, which is the Inter-Switch Link (ISL) and the connection to the same side ShMM. This VLAN consists of a 2 base interfaces (zre22 which is the same side ShMM and zre23 which is the ISL).

NOTE In the following script, provide an IP address for `zhp3/vlan4` that is compatible with the IP address you assigned to eth0 on your ShMMs. The IP address shown in the script is only an example.

To build *vlan4*, complete the following steps:

Step 1. Add the following `S24isl rc` script to the `/etc/rcZ.d` directory to ensure that *vlan3* is recreated when you reboot the Ethernet Switch Blade:

```
#!/bin/sh

#
```

```
# /etc/rcZ.d/S24isl
#
# rc script to build the inter-switch link (ISL) and
# connection to the same-side ShMM for the ATCA shelf.
#

set -u

case "$1" in
    start)

      # Build vlan4 that contains zre22..23.
        #
        zconfig zhp3: vlan4=zre22..23
        zconfig zre22..23=untag4

        # Assign an IP address to zhp3/vlan4:
        #
        ifconfig zhp3 192.168.0.43 netmask 255.255.255.0 up

      ;;

    stop)

      # Tear down vlan4 that contains zre22..23.
      #
      ifconfig zhp3 down
      zconfig zhp3:teardown

      ;;
   *)
      echo "Usage: $0 { start | stop }"
      exit 1
esac
exit 0
```

Step 2. Enter the `zsync` command to make the `rc` script persistent:

```
zsync
```

Step 3. Enter the following commands to start up `zhp3/vlan4`:

```
chmod 755 /etc/rcZ.d/S24isl start
```

```
/etc/rcZ.d/S24isl start
```

Step 4. Enter the following command to verify that `zhp3/vlan4` is properly configured:

```
zconfig -a

zhp0: vlan1 = zre13
zhp1: vlan2 = zre12
zhp2: vlan3 = zre0..11, zre14..21
```

```
zhp3: vlan4 = zre22..22
zre13 = untag1
zre12 = untag2
zre0..11, zre14..21 = untag3
zre22..23 = untag4

ifconfig zhp3

zhp3      Link encap:Ethernet  HWaddr 00:11:65:09:EC:1B
          inet addr:192.168.0.43  Bcast:192.168.0.255 Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:2228912 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1488770 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:100
          RX bytes:156761552 (149.4 Mb)  TX bytes:108022452 (103.0 Mb)

          Base address:0xc000
```

Four VLANs have now been defined in this sample topology: one for the cross-connect to the opposite-side ShMM, a second for the management LAN external connection, a third for the remaining base interfaces in the 14-Slot Shelf (representing the control network), and a fourth for the ISL and connection to the same-side ShMM.

NOTE Make the same set of changes to the redundant, failover Ethernet Switch Blade at this time in order to maintain High Availability integrity for the 14-Slot Shelf.

Configuring the Switch Blade – Hiding the ShMM and Exposing RMCP and SNMP-TRAP

Now you need to set up some `iptable` rules that allow us to effectively hide the ShMMs in their own private network, while still allowing RMCP and IPMI traffic to flow to and from the 14-Slot Shelf over the established management network. The reason for doing this is to establish better security for the 14-Slot Shelf.

To enhance security, blades or outside devices should not connect directly to the ShMMs. Instead, you want to expose the interesting management data from the ShMMs through the RMCP protocol. This network traffic originates from the management network, passes through the Switch Blades, and onto the ShMM's private network. Using the sample network topology, the only devices that can directly connect to the ShMM's console are serial devices that are in the same physical location as the ShMMs and the Ethernet Switch Blades.

To hide the ShMM and expose the RMCP and SNMP-TRAP, complete the following steps:

Step 1. To gain access to the ShMM using the RMCP protocol and to allow SNMP traffic to flow to agents running on the ShMMs and other blades, add two lines to the `/etc/services` configuration file on each Switch Blade.

Using the base serial port, or the configuration port you set up previously, add the following lines to the `/etc/services` file on each Switch Blade:

```
rmcp623/udp# To allow RMCP traffic to ShMMs.

agentx705/tcp# To allow traffic to off-switch sub-agents.
```

Step 2. Enter the following command to load the iptables driver into kernel memory:

```
insmod /lib/modules/2.4.2/kernel/net/ipv4/netfilter/iptable_nat.o
```

Step 3. Enter the following command to verify that the `iptables` driver loaded properly:

```
lsmod

Module                  Size  Used by
iptable_nat            15968   0  (unused)
bridge                 37040   0  (unused)
if_zxe               5586552   5
zfm_c                 271160   0
```

Step 4. To set up the `iptable` rules and ensure that they are reestablished when you reboot the Ethernet Switch Blade, you must add an `rc` script. Add the following `S25iptables rc` script to the `/etc/rcZ.d` directory:

```
#!/bin/sh


#
# /etc/rcZ.d/S25iptables
#
# rc script to build iptables that hide the ShMMs from direct
# access by blades or outside devices, but allows rmcp traffic in
# and snmp-trap traffic out.
#


set -u


case "$1" in
    start)


        #
        # Load iptables driver into kernel memory
        #
        insmod /lib/modules/2.4.2/kernel/net/ipv4/netfilter/iptable_nat.o

        #
        # Set the IP addresses of the management LAN (vlan2), the
        # ISL LAN (vlan4), and the SHMM (also on vlan4).
        #
        MGMT_IP=10.35.50.41
        ISL_IP=192.168.0.43
```

```
SHMM_IP=192.168.0.2

#
# Choose a mark your pre-routing DNAT rule.
#
MARK_DNAT=1

#
# Initialize iptables, and flush any existing rules.
#
iptables -P INPUT   ACCEPT
iptables –P OUTPUT  ACCEPT
iptables -P FORWARD DROP
iptables -F; iptables -F -t nat; iptables -F -t mangle
iptables -X

#
# Set up some NAT rules to allow rmcp traffic to flow to the
# SHMM, and to allow snmp-trap traffic, initiated from the SHMM,
# to flow to the designated system manager. Restrict all other
# outside traffic from directly talking to the SHMM.
#

#
# Mark incoming rmcp packets destined for the SHMM
#
iptables -t mangle -A PREROUTING -p udp -d $MGMT_IP \
-m multiport --dports rmcp -j MARK --set-mark ${MARK_DNAT}

#
# NAT rmcp packets to the SHMM.
#
```

```
iptables -t nat -A PREROUTING -p udp -d $MGMT_IP --dport \
rmcp -j DNAT --to-destination $SHMM_IP

#
# Change source ip of rcmp packet, so that SHMM can respond to
# the correct left or right Switch Blade.
#
iptables -t nat -A POSTROUTING -p udp -o zhp3 \
-mmark --mark ${MARK_DNAT}/${MARK_DNAT} -j SNAT \
--to-source $ISL_IP:10000-10999

#
# Allow snmp-trap traffic, initiated from the SHMM, to go to the
# designated system manager.
#
iptables -t nat -A POSTROUTING -p udp -s $SHMM_IP \
-o zhp1 --dport 162 -j SNAT --to-source $MGMT_IP:10000-10999

#
# Allow the following traffic to enter the Switch Blade.
#
iptables -A INPUT   -j ACCEPT  -m state \
--state ESTABLISHED,RELATED
iptables -A INPUT   -j ACCEPT  -i lo
iptables -A INPUT   -j ACCEPT  -i zhp3
iptables -A INPUT   -j ACCEPT  -p tcp --dport ftp
iptables -A INPUT   -j ACCEPT  -p udp --dport tftp
iptables -A INPUT   -j ACCEPT  -p tcp --dport http
iptables -A INPUT   -j ACCEPT  -p tcp --dport telnet
iptables -A INPUT   -j ACCEPT  -p udp --dport snmp
iptables -A INPUT   -j ACCEPT  -p udp --dport snmp-trap
iptables -A INPUT   -j ACCEPT  -p icmp --icmp-type echo-request
```

```
        #
        # Everything else coming into the Switch Blade, reject.
        #
        iptables -A INPUT   -j REJECT

        #
        # Allow the following traffic to be forwarded from the Switch Blade.
        #
        iptables -A FORWARD -j ACCEPT  -m state \
        --state ESTABLISHED,RELATED
        iptables -A FORWARD -j ACCEPT  \
        -mmark --mark ${MARK_DNAT}/${MARK_DNAT}
        iptables -A FORWARD -j ACCEPT  -i lo

        #
        # Everything else that could be forwarded, reject.
        #
        iptables -A FORWARD -j REJECT

        ;;

    stop)

        #
        # Flush iptables
        #
        iptables -F; iptables -F -t nat; iptables -F -t mangle
        iptables -X

      ;;
  *)
```

```
            echo "Usage: $0 { start | stop }"
            exit 1
        esac
        exit 0
```

NOTE The above script is one method of hiding the ShMM from the broader enterprise network. It is not the only method of achieving this objective, and network administrators may need to modify the script according to their particular network requirements.

NOTE SNMP traffic targeted for the ShMM will come in through the Switch Blade, and will be redirected to the ShMM by the proxy directive that you added earlier to the Switch Blade configuration file `/usr/share/snmp/snmpd.conf`.

Step 5. Enter the following command to make the `rc` script persistent:

```
zsync
```

Step 6. Enter the following command to start up the `iptable` rules:

```
chmod 755 /etc/rcZ.d/S25iptables
/etc/rcZ.d/S25iptables start
```

Step 7. Enter the following to see if the `iptable` rules are established:

```
iptables -nvL
```

```
Chain INPUT (policy ACCEPT 1 packets, 328 bytes)
 pkts bytes target     prot opt in     out     source               destination
   76  6125 ACCEPT     all  --  *      *       0.0.0.0/0            0.0.0.0/0
state RELATED,ESTABLISHED
    0     0 ACCEPT     all  --  lo     *       0.0.0.0/0            0.0.0.0/0
    0     0 ACCEPT     all  --  zhp3   *       0.0.0.0/0            0.0.0.0/0
    2   120 ACCEPT     tcp  --  *      *       0.0.0.0/0            0.0.0.0/0
tcp dpt:21
    0     0 ACCEPT     udp  --  *      *       0.0.0.0/0            0.0.0.0/0
udp dpt:69
    0     0 ACCEPT     tcp  --  *      *       0.0.0.0/0            0.0.0.0/0
tcp dpt:80
    0     0 ACCEPT     tcp  --  *      *       0.0.0.0/0            0.0.0.0/0
tcp dpt:22
    0     0 ACCEPT     tcp  --  *      *       0.0.0.0/0            0.0.0.0/0
tcp dpt:23
    0     0 ACCEPT     udp  --  *      *       0.0.0.0/0            0.0.0.0/0
udp dpt:161
    0     0 ACCEPT     udp  --  *      *       0.0.0.0/0            0.0.0.0/0
```

```
udp dpt:162
    0     0 ACCEPT     icmp --  *      *       0.0.0.0/0           0.0.0.0/0
icmp type 8
 1442  334K REJECT     all  --  *      *       0.0.0.0/0           0.0.0.0/0
reject-with icmp-port-unreachable

Chain FORWARD (policy DROP 0 packets, 0 bytes)
 pkts bytes target     prot opt in     out     source               destination
  386 21728 ACCEPT     all  --  *      *       0.0.0.0/0           0.0.0.0/0
state RELATED,ESTABLISHED
    2   102 ACCEPT     all  --  *      *       0.0.0.0/0           0.0.0.0/0
MARK match 0x1/0x1
    0     0 ACCEPT     all  --  lo     *       0.0.0.0/0           0.0.0.0/0
    0     0 REJECT     all  --  *      *       0.0.0.0/0           0.0.0.0/0
reject-with icmp-port-unreachable

Chain OUTPUT (policy ACCEPT 66 packets, 10224 bytes)
         pkts bytes target     prot opt in     out     source               destination
```

NOTE Make the same set of changes to the redundant, failover Ethernet Switch Blade at this time in order to maintain High Availability integrity for the 14-Slot Shelf.

Configuring the Fabric Interfaces (zre0 to 51 fabric)

Configure the fabric interfaces on the Ethernet Switch Blade, which will then become *vlan5*. The sample topology *vlan5* includes fabric ports zre0 through zre51. There is no need to assign an IP address to this VLAN as it merely passes traffic through to endpoints defined elsewhere in the 14-Slot Shelf. Any fabric plane traffic to the 14-Slot Shelf will come in through *vlan5*, which (acting as a switch), will send the traffic to the appropriate blade in the 14-Slot Shelf.

IMPORTANT When configuring the fabric interfaces on the HP bc2100 ATCA Server Blades, it is important to note that (in this topology) the Server Blade IP address must to reside within the fabric network space to ensure proper connectivity to the 14-Slot Shelf and to the outside enterprise.

To build *vlan5*, complete the following steps:

Step 1. Connect your laptop computer or terminal RS-232 port to the lower (fabric) serial port on the Switch Blade front panel.

Step 2. Issue the following command to ensure that all fabric interfaces are torn down:

```
zconfig -t
```

Step 3. Add the following `S50fabric rc` script to the `/etc/rcZ.d` directory to ensure that the fabric interfaces are recreated when you reboot the Ethernet Switch Blade:

```
#!/bin/sh

#
```

```
# /etc/rcZ.d/S50fabric
#
# rc script to build the fabric interface VLAN for
# the ATCA shelf.
#

set -u

case "$1" in
    start)

          # Build vlan5 that contains zre0..51 fabric.
     #
     zconfig zhp4: vlan5=zre0..51
     zconfig zre0..51=untag5

     # Do not assign an IP address to this zhp4/vlan5.
     # Just set the state of zhp4 to up.
     #
     ifconfig zhp4 up

     ;;

  stop)

          # Tear down vlan5 that contains zre0..51.
     #
     ifconfig zhp4 down
     zconfig zhp4:teardown

     ;;
 *)
          echo "Usage: $0 { start | stop }"
     exit 1
esac
exit 0
```

IMPORTANT The *zre51* port is the Inter-Switch Link (ISL) for the fabric-side of the switch. If you plan to connect the fabric portion of each switch into the same external network, do not include *zre51* in this VLAN configuration, as it will create a network loop and likely bring down the external network. In this case, create a separate VLAN for *zre51* so that the ISL is isolated from the external network.

Step 4. Enter the following command line to move the default script out of the way. This will ensure that the default script does not execute on the Switch Blade that configures the base interfaces:

```
mv /etc/rcZ.d/S50layer2 /etc/rcZ.d/off.S50layer2
```

Step 5. Enter the `zsync` command to make the `rc` script persistent:

```
zsync
```

Step 6. Enter the following commands to start up zhp4/vlan5:

```
chmod 755 /etc/rcZ.d/S50fabric
/etc/rcZ.d/S50fabric start
```

Step 7. Enter the following commands to see if zhp4/vlan5 is properly configured:

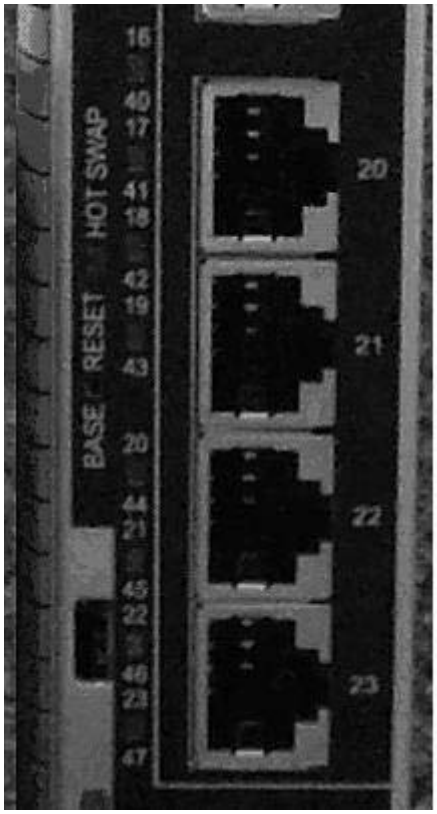
```
zconfig -a

zhp4: vlan5 = zre0..51
zre0..51 = untag5

ifconfig zhp4

zhp4      Link encap:Ethernet  HWaddr 00:11:65:0C:F0:38
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:100
          RX bytes:0 (0.0 b)  TX bytes:0 (0.0 b)
          Base address:0x5000
```

Now you have defined one VLAN (*vlan5*) that covers all fabric interfaces from *zre0* to *zre51*on the fabric side of the Switch Blade. Network administrators may want to configure the fabric side of the Switch Blade differently, depending on their network requirements.

IMPORTANT The *zre51* fabric port is the Inter-Switch Link (ISL) between the two Switch Blades. If you do not want fabric traffic to pass from one Switch Blade to the other, do not configure *zre51*.

NOTE For *vlan5* to pass traffic to your fabric/payload network, you must run a network cable from the Ethernet Switch Blade front panel (choose one of the RJ-45 connectors labeled *20*, *21*, *22*, or *23*) to a network connector in your fabric/payload network. The Switch Blade front panel fabric connectors are shown in Figure 7-10.

Figure 7-10Ethernet Switch Blade Fabric Connectors

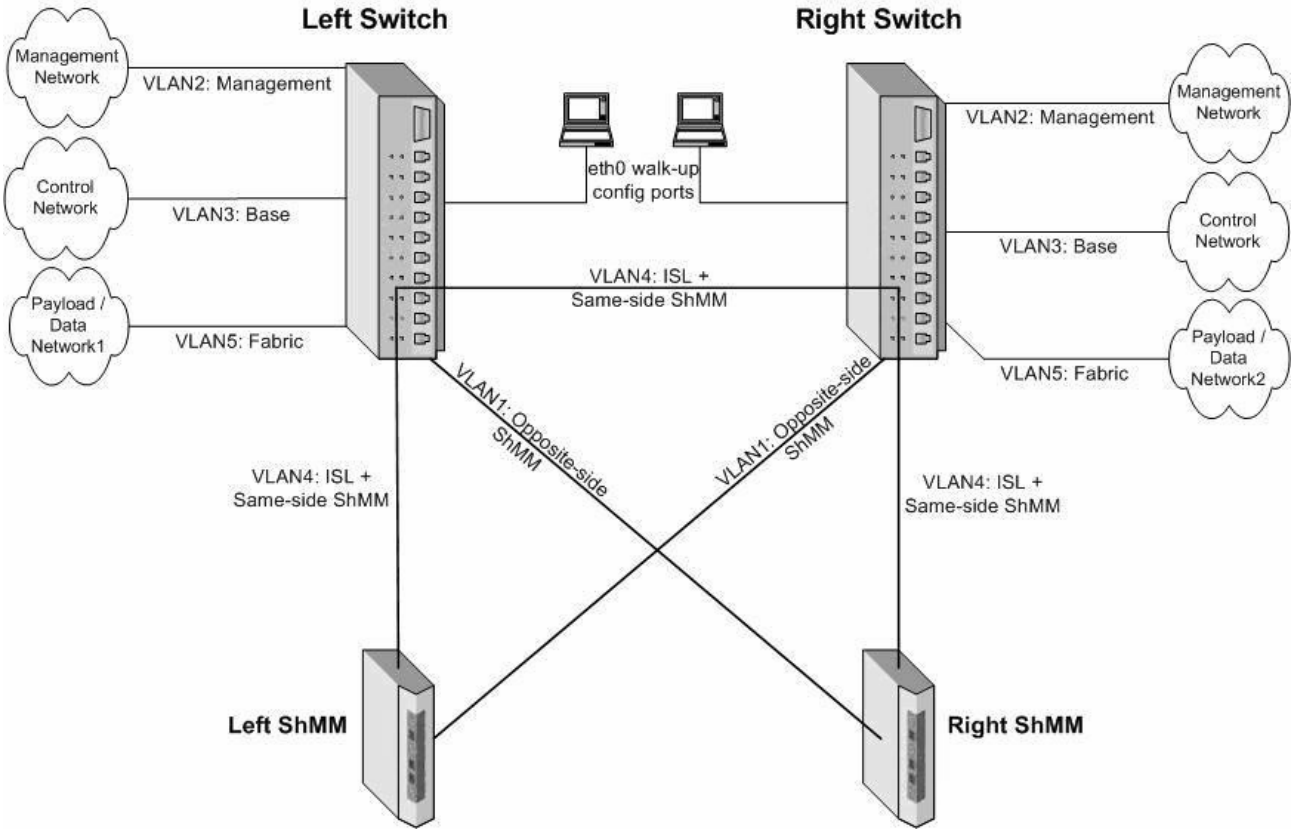


NOTE Make the same set of changes to the redundant, failover Ethernet Switch Blade at this time in order to maintain High Availability integrity for the 14-Slot Shelf.

Sample Network Topology Implementation

Now that *vlan1* through *vlan5* are configured (above in this chapter), you have an implementation of your sample network topology as shown in Figure 7-11 on page 93.

Figure 7-11 Configured Sample Network Topology



Ethernet Switch Blade Port and IPMB Mappings

Figure 7-12 on page 94 provides an Ethernet Switch Blade Port and IPMB map to help you understand how the base and fabric zre and IPMB addresses are mapped inside the HP bh5700 ATCA 14-Slot Blade Server.

Figure 7-12 Port IPMB Mapping

								switch 7	switch 8										
Phys Slot	14-slot	–	1	2	3	4	5	6	**7**	**8**	9	10	11	12	13	14	–	Sm-L	Sm-R	14-slot	**Phys Slot**
	16-slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			16-slot	
Logical Slot	dec	15	13	11	9	7	5	3	**1**	**2**	4	6	8	10	12	14	16	–	–	dec	**Logical Slot**
	hex	F	D	B	9	7	5	3	**1**	**2**	4	6	8	A	C	E	10	--	--	hex	
I^2C		4F	4D	4B	49	47	45	43	**41**	**42**	44	46	48	4A	4C	4E	50	8	9		**I^2C**
IPMB		9E	9A	96	92	8E	8A	86	**82**	**84**	88	8C	90	94	98	9C	A0	10	12		**IPMB**
Bchan	dec	15	13	11	9	7	5	3	**2**	**2**	4	6	8	10	12	14	16	B1	B2	dec	**Bchan**
	hex	F	D	B	9	7	5	3	**2**	**2**	4	6	8	A	C	E	10	B1	B2	hex	
Bzre		20	10	8	6	4	2	0	**23**	**23**	1	3	5	7	9	11	21	22/13	13/22		**Bzre**
Fchan	dec	14	12	10	8	6	4	2	–	–	3	5	7	9	11	13	15	–	–	dec	**Fchan**
	hex	E	C	A	8	6	4	2	--	--	3	5	7	9	B	D	F	--	--	hex	
Fzre-p0		40	36	32	28	16	8	0	**51**	**51**	4	12	24	30	34	38	42	–	–		**Fzre-p0**
Fzre-p1		41	37	33	29	17	9	1	**–**	**–**	5	13	25	31	35	39	43	–	–		**Fzre-p1**
Fzre-p2		–	–	–	–	18	10	2	**–**	**–**	6	14	26	–	–	–	–	–	–		**Fzre-p2**
Fzre-p3		–	–	–	–	19	11	3	**–**	**–**	7	15	27	–	–	–	–	–	–		**Fzre-p3**

Base face = 12 xx 14 15 Base rear = 16 17 18 19
Fabric face = 20 21 22 23 Fabric rear = 44 45 46 47
10Gb = 48 49 50

Configuring the HP bc2100 ATCA Server Blade Ethernet Interface Connectors

To connect your HP bc2100 ATCA Server Blades into the sample network topology (created earlier in this chapter), you must configure at least some of the Ethernet interfaces included in the Server Blade. There are six Ethernet external interface connectors on each Server Blade; *eth0* through *eth5*. Table 7-1 provides a map of the Server Blade.

Table 7-1 14-Slot Shelf Server Blade External Ethernet Connections

Server Blade Interface	Switch Blade Connection	Base or Fabric
eth0	Left Switch Blade	Base
eth1	Right Switch Blade	Base
eth2	Left Switch Blade	Fabric
eth3	Right Switch Blade	Fabric
eth4	Left Switch Blade	Fabric
eth5	Right Switch Blade	Fabric

IMPORTANT When setting up the *eth0* through *eth5* network interfaces on your Server Blades, remember that any assigned IP address on these interfaces must reside within the base or fabric network domains that you have already established for the Switch Blades.

NOTE The external Ethernet interface mapping described in Table 7-1 on page 94 may vary, depending on how your Linux kernel is configured and in what order the kernel detects the physical network interfaces present on the Server Blade. Table 7-1 represents the mapping as seen by the Debian (2.6 Kernel) Linux OS.

Serial access to the HP bc2100 ATCA Server Blade is provided through an RJ-45 connector located below the four LAN ports (and just above the two USB connectors) on the Server Blade front panel. Serial access (RS-232) is set to 8 data bits, 1 stop bit, no parity, and 9600 baud.

NOTE You must use an RJ-45/DB-9 adapter cable (supplied with your HP bh5700 ATCA 14-Slot Blade Server) in combination with a modem eliminator cable (with a DB-9 *female* connector on each end) in order to connect your terminal or laptop computer to a serial port on the 14-Slot Shelf.

The Server Blade BIOS controls the activation of the four LAN fabric ports on the Server Blade front panel. If the four LAN fabric ports are not active on the front panel, then they connect into the fabric domain of the Switch Blades through the 14-Slot Shelf blade cage backplane.

NOTE There is no designated out-of-band (OOB) LAN port for the Server Blade, as there is for the Ethernet Switch Blades and the ShMMs.

Configuring the 14-Slot Blade Server for High Availability

High availability (HA) is a feature implemented within the Ethernet Switch Blades, and taken advantage of the HP bc2100 ATCA Server Blades. This feature is also more formally known as *Surviving Partner*.

The Ethernet Switch Blades High Availability is implemented in the Ethernet Switch Blade using the Inter-Switch Link (ISL / vlan4) that connects the two Switch Blades. In addition to the ISL, the Switch Blade also employs the *Virtual Router Redundancy Protocol,* also known as *vrrp*. The vrrp protocol is implemented as a daemon (*vrrpd*) that runs whenever the surviving partner software is enabled.

NOTE The *vrrpd* daemon is an open source (GPL) project. You can download this code from the following URL: https://sourceforge.net/projects/vrrpd.

The *surviving partner* software enables you to configure two Ethernet Switch Blades to act as a Master/Backup pair, with three distinct failover modes available. You can specify the type of failover event that will cause the backup Switch Blade to take over switching operations.

The three available HA failover modes are:

- Port failover – an individual network link can failover to the backup Switch Blade.
- VLAN failover – any link failure in a defined VLAN causes the entire VLAN to failover to the backup Switch Blade.
- Switch failover – any link failure on the entire Switch Blade causes all links (including all defined VLANs) to failover to the backup Switch Blade.

To enable the high-availability (*surviving partner*) software, you (or an administrator) must manually create a configuration file known as `zsp.conf`. This file contains instructions to the *surviving partner* set-up software that runs on the Switch Blade. Included in the config file is a complete description for all of the Switch Blade's VLANs, their IP addresses, sibling IP addresses, and virtual IP addresses. Additional parameters in the config file are used to control the failover dynamics.

A sample `zsp.conf` is located on the Switch Blade under:

`/etc/rcZ.d/surviving_partner/zsp.conf`

You should use a `zsp.conf` file that follows the conventions of your sample network topology. The IP addresses used here are the same IP addresses that you have been using throughout this sample topology development description. Only VLANs that have assigned IP addresses can be set up for failover. So, for example, if you need to have high availability for ports defined in *vlan3*, then *vlan3* must get an IP assignment (which would be done in the `S23base rc` script). The sample `zsp.conf` file below shows only how to set up high availability for *vlan2* and *vlan4*.

The following provides a sample `zsp.conf` that follows your network conventions:

```
#
# (C) Copyright 2005 Hewlett-Packard Development Company, L.P.
# (C) Copyright 2002 ZNYX Networks, Inc.
# All Rights Reserved.
#
# You must have an OpenArchitect/HA Suite RTU license for the chassis to
# use any OpenArchitect high availability functionality or component on the
# Switch Blades within the chassis or use OpenArchitect/Node on any of the CPU
# host cards. This includes executing this utility script.
#

#
# First, configure VLANs for the shmm, manageability, base, and Switch Blade
# interconnect interfaces.
#
zconfig zhp0: vlan1 = zre13;
zconfig zhp1: vlan2 = zre12;
zconfig zhp2: vlan3 = zre0..11, zre14..21;
zconfig zhp3: vlan4 = zre22..23;

#
# Untag the raw ethernet ports for each defined VLAN.
#
zconfig zre13 = untag1;
zconfig zre12 = untag2;
zconfig zre0..11, zre14..21 = untag3;
zconfig zre22..23=untag4

#
# Assign internet addresses to the defined VLAN interfaces.
# The first address is for the master Switch Blade. The remaining addresses
# are handed out to the backup (sibling) Switch Blades on a first come
# first serve basis in the order specified. Each zconfigured interface
# should have sibling addresses specified, except for the base interface,
# zhp0 (opposite-side ShMM) does not failover.
```

```
# zhp2 does not have an assigned IP address.
#

sibling_addresses: zhp1 = 10.35.50.41, 10.35.50.42 netmask 255.0.0.0;
sibling_addresses: zhp3 = 192.168.0.43, 192.168.0.44 netmask 255.255.255.0;

#
# The virtual address spans the sibling group, giving hosts and routers
# a single point to connect to, or a single point to use as, a router. A
# virtual address should not be specified for the interconnect interface.
# For pure layer 2 failover, no virtual address is required.
# Note: ISL (zhp3) does not need a virtual address.
#
vrrp_virtual_address: zhp1 = 10.35.50.43 netmask 255.0.0.0;


#
# Define the interconnect VLAN interface. This VLAN allows network traffic
# to flow to/from the master Switch Blade to/from the backup switch.
#
interconnect: zhp3;

#
# Port definitions:
# Define what ports are configured for failover. Specifications
# can be by zhp or zre name. The zhp name is a shortcut to specify
# the entire port group associated with that interface. In the end,
# these definitions are on a port by port basis. Note: zhp and
# zre names cannot be mixed on the same line.
#
RAINlink:  zre13, zre12, zre0..11, zre14..21;

##############################  Special Modes ##############################

#
# VRRP modes:
# The block_crossconnect mode causes the equivalent of STP blocking on the
# crossconnect ports of the VRRP Backup. The block_crossconnect mode is
# meant as a replacement for STP, however, the Switch Blades connected to the
# crossconnect ports must be Ethernet Switch Blades running Surviving Part-
ner.
#
# The RAINlink_xmit_on_failover mode requires that the OpenNode blades
# connected to RAINlink ports transmit a packet when failing over, so that
# The Layer 2 tables will learn the new port/MACaddress relationship. An
# example is the SNAP_BCAST_MODE in RAINlink or a gratuitous ARP. If
# using RAINlink_xmit_on_failover, it is recommended to use the -i D option
# to zl3d.
#
vrrp_mode: RAINlink_xmit_on_failover;
```

```
#
# Failover Modes:
# switch-failover, vlan-failover or port-failover are mutually exclusive.
# They describe what occurs if a port fails. For switch-failover, if any port
# fails, all functionality of the current switch is moved to the backup
# For vlan-failover, if a port fails in the VLAN, then all the ports that
# are a member of that VLAN are failed over. For port-failover, each port
# can failover independently. For VLAN and port-failover the interconnect
# will need to be used to maintain connectivity, requiring all VLANs to
# include the interconnect ports.
#
failover_mode: switch;

#
# vrrp_msg_rate is the time in milliseconds between transmissions of
# VRRP messages on the interconnect. The VRRP protocol requires the
# absence of 3 VRRP messages before concluding that the remote Switch Blade
# has failed. The msg_rate must match the msg_rate of all siblings.
# Anything other than multiples of seconds is non-conformant
# with the VRRP specification and will only run with ZNYX supplied
# vrrpd.
#
vrrp_msg_rate: 100;

#
# vrrp_def_priority is the base priority used for resolving VRRP mastership
# conflicts. It does not need to be modified unless one Switch Blade is pre-
ferred.
#
vrrp_def_priority: 254;
```

After the configuration file is populated, you must enter the following Switch Blade shell command:

```
zspconfig -f /etc/rcZ.d/surviving_partner/zsp.conf
```

The `zspconfig` shell command first checks for syntax errors, and then processes the surviving partner configuration file. If no errors are discovered, `zspconfig` creates a new startup script called `/etc/rcZ.d/S70Surviving_partner`.

When enabling the Switch Blades to run in HA mode, you must disable any other user created startup scripts (such as `S21cross-shmm`, `S22mgmt`, `S23base`, and `S24isl`) because `S70Surviving_partner` replaces all of them. The best way to disable a startup script is to rename it with the prefix `off` . For example:

```
mv /etc/rcZ.d/S21cross-shmm /etc/rcZ.d/off.S21cross-shmm
mv /etc/rcZ.d/S22mgmt /etc/rcZ.d/off.S22mgmt
mv /etc/rcZ.d/S23base /etc/rcZ.d/off.S23base
mv /etc/rcZ.d/S24isl /etc/rcZ.d/off.S24isl
```

The `zspconfig` shell command also packages a counterpart `zsp.conf` file for the sibling Switch Blade, and places it in a known location (`/tftpboot`) where the sibling Switch Blade can find it. After running `zspconfig`, the Switch Blade will be running the `vrrpd` daemon and the `dhcpd` daemon. The `vrrpd` daemon

monitors the network links that are set up for failover operation. The dhcpd daemon process enables the sibling Switch Blade to establish communication with the first Switch Blade to retrieve its surviving partner configuration file. These daemon processes can be seen by running the ps command on the Switch Blade:

```
ps -efw

root     19577 /usr/sbin/vrrpd -d 100m -c
/etc/rcZ.d/surviving_partner/vrrpd.conf
root     19579 /usr/sbin/vrrpd -d 100m -c
/etc/rcZ.d/surviving_partner/vrrpd.conf
root     19641 dhcpd -cf /etc/rcZ.d/surviving_partner/dhcpd.conf zhp0
```

You can see that the Switch Blade is running in *Master* mode by entering the vrrpconfig command:

```
vrrpconfig -a


 IF     State  ID  Interconnect  Interval  Prior  AddrCnt     IpAddrs
-------------------------------------------------------------------------

zhp1     M     2       zhp0       100       224      1      10.35.50.41

zhp3     M     4       zhp0       100       224      1      192.168.0.43
```

A state designated as *M* stands for Master. A state designated as *B* stands for Backup. In order to complete the installation of the surviving partner software, you must log onto the sibling Switch Blade and enter the following command:

```
zspconfig -u zhp3  # Where zhp3 is the vlan that contains the
                   # ISL interface (zre23). If the sibling
                   # Switch Blade has not been configured at all,
                    # use zhp0.
```

Here, zspconfig locates the first Switch Blade via dhcp requests, and proceeds to download its already-prepared zsp.conf configuration file (which is located in /tftpboot on the first Switch Blade), and process it. The result is a new S70Surviving_partner startup script for the sibling Switch Blade. After running zspconfig, the sibling Switch Blade is now running vrrpd, with an installation of the surviving partner software in *Backup* mode. After completing this step on the sibling Switch Blade, do not forget to move any user-created rc scripts out of the way, as you did on the first Switch Blade, as follows:

```
mv /etc/rcZ.d/S21cross-shmm /etc/rcZ.d/off.S21cross-shmm
mv /etc/rcZ.d/S22mgmt /etc/rcZ.d/off.S22mgmt
mv /etc/rcZ.d/S23base /etc/rcZ.d/off.S23base
mv /etc/rcZ.d/S24isl /etc/rcZ.d/off.S24isl
```

Now issue the vrrpconfig command to see the HA status of the sibling Switch Blade:

```
vrrpconfig -a


 IF     State  ID  Interconnect  Interval  Prior  AddrCnt     IpAddrs
-------------------------------------------------------------------------

zhp1     B     2       zhp0       100       224      1      10.35.50.42
```

```
zhp3      B      4        zhp0        100        224       1       192.168.0.44
```

It is a good idea to reboot both Switch Blades after configuring them for surviving partner mode, in order to ensure that there were are no problems with the installation. Before rebooting the Switch Blades, however, it is important to save the changes made to the Switch Blade by using the `zsync` command as follows:

```
zsync
```

For more information on the high-availability features that the Switch Blade provides see *HP bh5700 ATCA 14-Slot Blade Server, Ethernet Switch Blade User and Service Guide, Chapter 4, High Availability Networking.*

The HP bc2100 ATCA Server Blades The HP bc2100 ATCA Server Blades running the Linux operating system can take advantage of ATCA Switch Blades that are configured for HA operation by enabling the network *bonding* driver. The *bonding* driver is a Linux kernel driver that creates a logical network interface by aggregating multiple physical network interfaces.

Source code and general information about the Linux *bonding* driver can be found at:

http://sourceforge.net/projects/bonding/.

A Linux document explaining how to enable the *bonding* driver can be found at:

http://www.kernel.org/pub/linux/kernel/people/marcelo/linux-2.4/Documentation/networking/bonding.txt

Example Usage of the Linux Bonding Driver This example usage of the Linux Bonding Driver makes the following initial assumptions:

- The HP bc2100 ATCA Server Blade is running the Linux OS.
- That the Linux Server Blade *eth0* is a physical network interface that is connected to the left Ethernet Switch Blade installed in 14-Slot Shelf blade cage physical slot 7.
- That the Linux Server Blade *eth1* is a physical network interface that is connected to the right Ethernet Switch Blade installed in 14-Slot Shelf blade cage physical slot 8.

With the above assumptions in force, complete the following steps to set up the Linux Bonding Driver:

Step 1. Enter the following commands to create `bond0`, a logical network interface, that aggregates *eth0* and *eth1*:

```
modprobe bonding       # Load the bonding driver into kernel memory

ifconfig eth0 up# Set eth0 status to up
ifconfig eth1 up# Set eth1 status to up

#
# Configure bond0 as a logical interface
#
ifconfig bond0 10.35.50.xx netmask 255.0.0.0 up

#
# Enslave the physical network ports.
#
ifenslave bond0 eth0# Add physical eth0 to bond0
ifenslave bond0 eth1# Add physical eth1 to bond0
```

NOTE You may want to put the above commands into an `rc` script and have them executed at boot time so that the bonding driver is always enabled.

NOTE If you intend to acquire the IP address for `bond0` by using DHCP, the physical MAC address that is presented to the DHCP server is the address of the first enslaved physical network interface (*eth0* in this example).

Step 2. When you have finished creating `bond0`, issue the `ifconfig` command on the Server Blade. This will show the following network interfaces:

```
bond0     Link encap:Ethernet  HWaddr 00:A0:A5:55:0C:44
          inet addr:10.35.50.xx  Bcast:10.255.255.255  Mask:255.0.0.0
          UP BROADCAST RUNNING MASTER MULTICAST  MTU:1500  Metric:1
          RX packets:59724 errors:0 dropped:0 overruns:0 frame:0
          TX packets:684 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:7280830 (6.9 MiB)  TX bytes:99226 (96.9 KiB)

eth0      Link encap:Ethernet  HWaddr 00:A0:A5:55:0C:44
          UP BROADCAST RUNNING SLAVE MULTICAST  MTU:1500  Metric:1
          RX packets:30170 errors:0 dropped:0 overruns:0 frame:0
          TX packets:389 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:3676981 (3.5 MiB)  TX bytes:56878 (55.5 KiB)
          Base address:0xac00 Memory:f6ae0000-f6b00000

eth1      Link encap:Ethernet  HWaddr 00:A0:A5:55:0C:44
          UP BROADCAST RUNNING SLAVE MULTICAST  MTU:1500  Metric:1
          RX packets:29554 errors:0 dropped:0 overruns:0 frame:0
          TX packets:295 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:3603849 (3.4 MiB)  TX bytes:42348 (41.3 KiB)

          Base address:0xa800 Memory:f6ac0000-f6ae0000
```

Because the logical network interface defined by `bond0` contains links to both of the Ethernet Switch Blades, a failure of either Switch Blade allows the `bond0` interface to continue operating through the surviving Switch Blade.

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